VOLUME 17 PART 1

NORTH AMERICAN FLORA

PANDANALES–POALES

TYPHACEAE

PERCY WILSON

SPARGANIACEAE, ELODEACEAE, HYDROCHARITACEAE

PER AXEL RYDBERG

ZANNICHELLIACEAE, ZOSTERACEAE, CYMODOCEACEAE NAIADACEAE, LILAEACEAE

NORMAN TAYLOR

SCHEUCHZERIACEAE

NATHANIEL LORD BRITTON

ALISMACEAE

JOHN KUNKEL SMALL

BUTOMACEAE, POACEAE (pars)

GEORGE VALENTINE NASH

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ANNOUNCEMENT

The NORTH AMERICAN FLORA is designed to present in one work descriptions of all plants growing, independent of cultivation, in North America, here taken to include Greenland, Central America, the Republic of Panama, and the West Indies, except Trinidad, Tobago, and Curaçao and other islands off the north coast of Venezuela, whose flora is essentially South American.

The work will be published in parts at irregular intervals, by the New York Botanical Garden, through the aid of the income of the David Lydig Fund bequeathed by Charles P. Daly.

It is planned to issue parts as rapidly as they can be prepared, the extent of the work making it possible to commence publication at any number of points. The completed work will form a series of volumes with the following sequence:

Volume 1. Mycetozoa, Schizophyta, Diatomaceae.

Volumes 2 to 10. Fungi.

Volumes 11 to 13. Algae.

Volumes 14 and 15. Bryophyta.

Volume 16. Pteridophyta and Gymnospermae.

Volumes 17 to 19. Monocotyledones.

Volumes 20 to 32. Dicotyledones.

The preparation of the work has been referred by the Scientific Directors of the Garden to a committee consisting of Dr. N. L. Britton, Dr. W. A. Murrill, and Dr. J. H. Barnhart.

Professor George F. Atkinson, of Cornell University; Professors Charles R. Barnes and John M. Coulter, of the University of Chicago; Mr. Frederick V. Coville, of the United States Department of Agriculture; Professor Edward L. Greene, of the United States National Museum; Professor Byron D. Halsted, of Rutgers College; and Professor William Trelease, of the Missouri Botanical Garden, have consented to act as an advisory committee.

Each author will be wholly responsible for his own contributions, being restricted only by the general style adopted for the work, which must vary somewhat in the treatment of diverse groups.

The subscription price is fixed at $1.50 for each part; it is expected that four or five parts will be required for each volume. A limited number of separate parts will be sold at $2.00 each. Address:

THE NEW YORK BOTANICAL GARDEN
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Class ANGIOSPERMAE

Carpel or pistil a closed cavity formed by the uniting of the margins of a rudimentary leaf, or sometimes of several leaves. The ovules (macrosporanges) are borne on the inner face of this cavity and within it the seeds are matured. A pollen-grain alighting on the stigma (a specialized portion of the carpel) sends out a pollen-tube which penetrates the tissues of the carpel and on reaching an ovule enters its orifice (micropyle), or rarely the pollen-tube enters at the chalaza. Fertilization is effected by a sperm-cell at the end of a pollen-tube coming in contact with an egg-cell in the embryo-sac.

Subclass MONOCOTYLEDONES

Stems endogenous, with no distinction into bark, wood, and pith, consisting of a ground-mass of soft tissue (parenchyma) in which strands or bundles of wood-cells are irregularly distributed. Leaves mostly alternate, sheathing at the base; blades usually parallel-nerved, entire or essentially so, rarely separating by a manifest articulation. Perianth and essential parts of the flower usually in threes or sixes. Embryo with a single cotyledon, the early leaves always alternate.

Order PANDANALES

By John Kunkel Small

Bog-inhabiting or aquatic herbs, perennial by elongate rootstocks. Leaves alternate, erect and partially appressed to the stem or spreading; blades narrow, commonly greatly elongate. Flowers incomplete, imperfect, inconspicuous, borne in an elongate cylindric spike-like raceme with an unbranched rachis which is divided into a lower pistillate and an upper staminate portion, or in globular spikes which are usually borne on a branched rachis. Perianth of bristles or scales. Androecium of 2–7 stamens, the anthers with large connectives. Gynoecium of a single carpel or of 2 united carpels, the style present and elongate, or wanting; ovary 1- or 2-celled, sessile or stipitate. Fruit nut-like, hidden in a dense mass of bristles or exposed.

Flowers borne in cylindric, spike-like racemes; perianth of bristles; gynoecium narrowed into a stipe at the base. — Fam. 1. Typhaceae.

Flowers borne in globular spikes; perianth of scales; gynoecium sessile. — Fam. 2. Sparganiaceae.

Family 1. **TYPHACEAE**

By Percy Wilson

Simple-stemmed, monoecious, marsh or aquatic herbs, perennial by creeping rootstocks, with fibrous roots and erect terete stems. Leaves alternate, linear or strap-shaped, sheathing at the base, flat, more or less convex on the back, parallel-veined. Flowers densely crowded in compact cylindric spike-like racemes. Staminate inflorescence terminal, above the pistillate and separated from or contiguous to it; each raceme usually subtended in the early anthesis by a spathaceous fugacious bract. Staminate flowers irregularly intermingled with variously shaped hairs. Stamens 1–7; filaments short or long, free or connate; anthers linear or oblong, basifixed, 2-celled, longitudinally dehiscent; pollen-grains simple or compound. Pistillate flowers ebracteolate or mingled with slender clavate or spatulate bracteoles, and often with abortive pistillate flowers mixed with them; perianth composed of several delicate silky, simple or clavate hairs. Ovary usually 1-celled, more or less stalked, with a solitary pendulous ovule; style elongate, slender, erect; stigma linear or spatulate, unilateral. Fruit minute, subsessile or long-stipitate, ellipsoid or subcylindric. Seed subcylindric or narrowly ellipsoid; albumen farinaceous; testa thin, membranaceous; embryo cylindric, straight.

1. **TYPHA** L. Sp. Pl. 971. 1753.

Characters of the family.

Type species, *Typha latifolia* L.

Racemes with staminate and pistillate portions usually separated; pollen of simple grains; fruiting pedicels short, rigid, 1 mm. or less. 1. *T. angustifolia.*
Racemes with staminate and pistillate portions usually contiguous; pollen-grains in 4's; fruiting pedicels bristle-like, 2–3 mm. long. 2. *T. latifolia.*

1. **Typha angustifolia** L. Sp. Pl. 971. 1753.

Typha domingensis Pers. Syn. Pl. **2**: 532. 1807.
Typha spiralis Raf. Atl. Jour. **1**: 148. 1832.
Typha gracilis Raf. New Fl. **2**: 91. 1837.
Typha latifolia angustifolia Wood, Class Book 367. 1845.
Typha angustifolia domingensis Griseb. Fl. Brit. W. Ind. 512. 1864.
Typha americana L. C. Rich.; Rohrb. Verh. Bot. Ver. Brand. **11**: 97, as synonym. 1870.
Typha bracteata Greene, Bull. Calif. Acad. **2**: 413. 1887.
Typha dominginensis Kronf. Verh. Zool.-Bot. Ges. Wien **39**: 163. 1889.
Typha angustifolia dominginensis Kronf. Verh. Zool.-Bot. Ges. Wien **39**: 163, as synonym. 1889.

Stems slender, 1–4 m. tall; leaves narrowly linear, 3–20 mm. broad; racemes light- or dark-brown, the staminate and pistillate portions usually separated by a small interval, each 1–4 dm. in length; pistillate portion with bractlets, 0.5–2 cm. in diameter; stigmas linear or oblong-linear; hairs accompanying the pistillate flowers with or without club-shaped tips; pollen-grains simple; the denuded rachis of the mature pistillate raceme slender, 3–4.5 mm. thick, roughened by the short, rigid pedicels which are 1 mm. or less in length.

Type locality: Europe.

Distribution: Marshes, chiefly along the coast, from Nova Scotia to Florida, and westward to California; Mexico to Panama, Colombia, Guiana, and Patagonia; Bermuda, Bahamas, Greater Antilles, and Danish West Indies; also in Europe and Asia.

Illustrations: Benth. Ill. Handb. Brit. Fl. **2**: *f. 932*; Pratt, Fl. Pl. Great Brit. **3**: *pl. 234, f. 2*; Engl. Bot. *pl. 1456*; Britt. & Brown, Ill. Fl. *f. 137*; Coste, Fl. Fr. *f. 3690*; Bull. Torrey Club **15**: 6. *f. 4–9*; Bild. Nord. Fl. *pl. 494*; Verh. Zool.-Bot. Ges. Wien **39**: *pl. 4, f. 8*; Bull. Torrey Club **15**: 7. *f. 10–14*; Engler, Pflanzenreich **4**^{8}: *f. 4 G*; Curtis, Fl. Lond. **3**: *pl. 62* (as *T. minor*); Schkuhr, Handb. **3**: *pl. 281.*

2. **Typha latifolia** L. Sp. Pl. 971. 1753.

Typha elatior Raf. Atl. Jour. 1: 148. 1832.
Typha crassa Raf. Atl. Jour. 1: 148. 1832.
Typha latifolia elongata Dudley, Bull. Cornell Univ. 2: Fl. 102. 1886.
Typha elongata Kronf. Verh. Zool.-Bot. Ges. Wien 39: 176, as synonym. 1889.

Stems stout, 1–2.7 m. tall; leaves linear, 6–25 mm. broad; racemes dark-brown or blackish, the staminate and pistillate portions usually contiguous, each 8–20 cm. or more in length; pistillate portion without bractlets, 2–3.5 cm. in diameter; stigmas rhomboidal or spatulate; pollen-grains in 4's; the denuded rachis of the mature pistillate raceme stout, 8–11 mm. thick, conspicuous by the long, bristle-like, persistent pedicels, which are sometimes 3 mm. in length.

TYPE LOCALITY: Europe.

DISTRIBUTION: In marshes throughout the United States and Canada as far north as Fort Franklin; also in Europe and Asia.

ILLUSTRATIONS: Benth. Ill. Handb. Brit. Fl. 2: *f. 931;* Pratt, Fl. Pl. Great Brit. 3: *pl. 234, f. 1;* Engl. Bot. *pl. 1455;* Britt. & Brown, Ill. Fl. *f. 136;* Coste, Fl. Fr. *f. 3687;* Bull. Torrey Club 15: 6. *f. 1–3;* Cycl. Am. Hort. *f. 2607;* Bild. Nord. Fl. *pl. 493;* Curtis, Fl. Lond. 3: *pl. 61* (as *T. major*); Schkuhr, Handb. 3: *pl. 281.*

Family 2. SPARGANIACEAE

By Per Axel Rydberg

Perennial monoecious, marsh or water plants, with horizontal rootstocks and with fascicles of fibrous roots at the base of the stem. Stems erect, or immersed and floating. Leaves linear, alternate, flat or more or less triangular-keeled below, sheathing at the base. Flowers in dense globose heads on the upper part of the stem or its branches, sessile or peduncled, the staminate ones uppermost. Perianth of several (3–6) chaffy scales. Stamens mostly 5; filaments distinct; anthers oblong. Pistils 1, or 2 with ovaries and styles united; stigmas oblong, lanceolete, or linear; ovules anatropous. Fruit 1- or 2-celled, nut-like, each cell with a single seed. Endosperm copious, surrounding the straight embryo.

1. SPARGANIUM L. Sp. Pl. 971. 1753.

Characters of the family.

Type species, *Sparganium erectum* L.

A. Achenes broadly obovoid or cuneate-obpyramidal, sessile, distinctly beaked; inflorescence compound; fruiting heads 2–3 cm. in diameter; leaves somewhat keeled.
  Achenes cuneate-obpyramidal, almost as broad as long, truncate or depressed at the summit. — 1. *S. eurycarpum.*
  Achenes obovoid, decidedly longer than broad, rounded at the summit.
    Fruiting heads 2–2.5 cm. in diameter; body of the achenes 7–9 mm. long; claws of the sepals narrow. — 2. *S. Greenei.*
    Fruiting heads 2.5–3 cm. in diameter; body of the achenes fully 1 cm. long; claws of the sepals dilated below the middle, almost as broad as the blades. — 3. *S. californicum.*

B. Achenes fusiform (in *S. minimum* somewhat obovoid, but then short-beaked and short-stipitate).
  a. Stipes and beaks each 2 mm. long or more; fruiting heads 1.5 cm. in diameter or more; anthers 3–4 times as long as broad.
    * Beaks straight or slightly curved; stigmas linear.
      Heads all axillary; beaks shorter than the bodies of the achenes; leaves more or less keeled.
        Achenes dull; stigmas 2 mm. long or less.
          Inflorescence branched; branches geniculate, bearing 3–7 staminate heads. — 4. *S. androcladum.*
          Inflorescence simple, or, if branched, the branches strict and bearing 0–2 staminate heads. — 5. *S. americanum.*
        Achenes glossy; stigmas 2.5–3.5 mm. long. — 6. *S. lucidum.*
      Heads, at least some of them, supra-axillary.
        Leaves, at least the middle ones, strongly triangular-keeled; stem usually erect, strict.
          Fruiting heads more than 2 cm. in diameter; bracts ascending-spreading; beaks fully as long as the bodies of the achenes.
            Leaves 7–15 mm. wide, strongly veined; fruiting heads about 3 cm. in diameter; achenes brown, shining, gradually tapering into the beaks. — 7. *S. simplex.*
            Leaves 3–8 mm. wide, weakly veined; fruiting heads 2–2.5 cm. in diameter; achenes green, dull, abruptly contracted into the beaks. — 8. *S. chlorocarpum.*
          Fruiting heads rarely 2 cm. in diameter; stem slender; leaves narrow; bracts almost erect.
            Heads distant, nearly 2 cm. in diameter; achenes grayish-brown, distinctly nerved. — 9. *S. diversifolium.*
            Heads approximate, about 1.5 cm. in diameter; achenes dark olive-brown, not nerved. — 10. *S. acaule.*
        Leaves not keeled or only slightly so, narrow and slender; stem weak and often floating; beaks decidedly shorter than the bodies of the achenes.

Leaves usually 5–10 mm. wide; leaves and bracts conspicuously scarious-margined; heads 1.7–2 cm. in diameter; achenes more gradually beaked. 11. *S. multipedunculatum.*
Leaves 3–4 mm. wide; leaves and bracts not conspicuously scarious-margined; heads about 1.5 cm. in diameter; achenes abruptly beaked. 12. *S. angustifolium.*
** Beaks gladiate-curved; stigmas short, oblong. 13. *S. fluctuans.*
b. Stipes and beaks short or none, always less than 1 mm. long; fruiting heads about 1 cm. in diameter; stigmas oblong; anthers 1.5–2 times as long as broad.
Heads all sessile or the lowest short-pedicelled, axillary; the staminate head distant from the pistillate ones; leaves dark-green; achenes short-beaked. 14. *S. minimum.*
Lower pistillate heads distinctly pedicelled and supra-axillary; the staminate head close to the upper pistillate one, or merging with it; leaves light-green.
Achenes beaked; constriction below the middle of the body of the achene. 15. *S. Williamsii.*
Achenes beakless; constriction at the middle of the body of the achenes. 16. *S. hyperboreum.*

1. **Sparganium eurycarpum** Engelm.; A. Gray, Man. ed. 2. 430. 1856.

Sparganium ramosum Pursh, Fl. Am. Sept. 33. 1814. Not *S. ramosum* Huds. 1778.
Sparganium erectum Wood, Class Book ed 2. 523. 1847. Not *S. erectum* L. 1753.
Sparganium americanum Meinsh. Mél. Biol. Acad. St. Petersb. 13: 386. 1893. Not *S. americanum* Nutt. 1818.

Perennial, with a creeping rootstock and numerous roots at the base of the stem; stem erect, 5–15 dm. high, stout; leaf-blades somewhat keeled beneath, almost flat, dark-green, 5–10 dm. long, 7–10 mm. wide; bracts similar but shorter, very slightly if at all dilated and with very narrow scarious margins at the base; peduncles branched below, the lower branches with 1 or 2 pistillate and 2–6 staminate heads, the main axis often with 6–10 staminate heads; pistillate heads in fruit 2–2.5 cm. in diameter; achenes sessile, their bodies cuneate-obpyramidal, 3–5-angled, 6–8 mm. long and nearly as broad, truncate or depressed at the summit; beak about 3 mm. long; stigmas often 2, filiform, about 2 mm. long; sepals long-clawed, nearly as long as the body of the fruit, their blades cuneate-flabelliform, truncate, erose; anthers elliptic-clavate, about 1 mm. long and one fourth as thick.

TYPE LOCALITY: Not given.
DISTRIBUTION: Borders of water, from Newfoundland to Florida, California, and British Columbia.
ILLUSTRATIONS: Bull. Torrey Club 15: *pl. 79, f. 2;* Britt. & Brown, Ill. Fl. *f. 138;* Engler, Pflanzenreich 4^{10}: *f. 3 A.*

2. **Sparganium Greenei** Morong, Bull. Torrey Club **15**: 77. 1888.

Sparganium eurycarpum Greenei Graebner, in Engler, Pflanzenreich 4^{10}: 13. 1900.

Perennial, with a creeping rootstock, and numerous roots at the base of the stem; stem 6–15 dm. high, stout; leaf-blades 3–15 dm. long, keeled, rather soft, 8–12 mm. wide; lower bracts similar but shorter, neither dilated nor scarious-margined; the upper short and broad; inflorescence branched; lower branches erect, with usually 2 pistillate and 6–10 staminate heads, the main rachis often bearing 10–17 staminate heads; fruiting heads 2–2.5 cm. in daimeter; sepals clawed; blades cuneate or rhombic, decidedly broader than the narrow claw; achenes sessile, brown, shining, their bodies obovoid with a rounded summit, 7–9 mm. long, about 5 mm. thick, 3–5-angled; beak about 2 mm. long; stigmas filiform, about 1 mm. long, solitary or in about one third of the pistils 2; anthers oblong, fully 1 mm. long and one fourth as thick.

TYPE LOCALITY: Olima, Marine County, California.
DISTRIBUTION: In water, Lower California to Vancouver Island.
ILLUSTRATION: Bull. Torrey Club 15: *pl. 79, f. 3.*

3. **Sparganium californicum** Greene, Bull. Calif. Acad. **1**: 11. 1884.

Perennial, with a rootstock; stem stout, angled, 1–3 m. high; leaf-blades often 2 m. long, 1–1.5 cm. wide, dark-green, of a softer texture than in *S. eurycarpum*, keeled beneath; peduncle with erect branches; lower branches with 1 or 2 pistillate and 6–12

staminate heads; pistillate heads in fruit 2.5–3 cm. in diameter; sepals long-clawed; blades obovate, rounded and erose at the apex, scarcely wider than the dilated lower portion of the claws; achenes sessile, their bodies obovoid, 3–5-angled, rounded at the apex, about 1 cm. long and 6 mm. thick; beak nearly 2 mm. long; stigmas linear, usually 2.

TYPE LOCALITY: Calistoga, California.
DISTRIBUTION: Central California.

4. **Sparganium androcladum** (Engelm.) Morong, Bull. Torrey Club **15**: 78. 1888.

Sparganium americanum Ell. Bot. S. C. & Ga. **2**: 521. 1824. Not *S. americanum* Nutt. 1818.
Sparganium ramosum Chapm. Fl. S. U. S. 443. 1860. Not *S. ramosum* Huds. 1778.
Sparganium simplex androcladum Engelm.; A. Gray, Man. ed. 5. 481. 1867.
Sparganium simplex androgyna Meinsh. Mél. Biol. Acad. St. Petersb. **13**: 387. 1893.
Sparganium americanum androcladum Fernald & Eames, Rhodora **9**: 87. 1907.

Perennial, with a rootstock; stem 3–10 dm. high, erect; leaves dark-green, triangular at the base, 5–10 dm. long, 5–12 mm. wide; bracts similar but barely concave at the base, slightly dilated and narrowly if at all scarious-margined; inflorescence branched, with branches or peduncles axillary; lower branches usually with a single (sometimes no) pistillate head and 3–7 staminate ones, usually strongly geniculate; sepals with dilated claws, two thirds as long as the achenes, their blades cuneate and erose at the apex; fruiting heads 2–2.5 cm. in diameter; achenes stipitate, brown, dull, their bodies fusiform, 5–6 mm. long, 3 mm. thick, terete or obtusely angular, often constricted at the middle; stipe and beak each about 3 mm. long; stigma linear, about 2 mm. long; anthers linear-oblong, about 1 mm. long and one fourth as thick.

TYPE LOCALITY: New England.
DISTRIBUTION: Shallow water, Newfoundland to Florida, Alabama, and Minnesota.
ILLUSTRATIONS: Bull. Torrey Club 15: *pl. 79, f. 5;* Britt. & Brown, Ill. Fl. *f. 139;* Engler, Pflanzenreich 4^{10}: *f. 3 G.*

5. **Sparganium americanum** Nutt. Gen. **2**: 203. 1818.

Sparganium simplex Wood, Class Book ed. 2. 523. 1847. Not *S. simplex* Huds. 1778.
Sparganium simplex Nuttallii Engelm.; A. Gray, Man. ed. 5. 481. 1867.
Sparganium angustifolium Graebner, in Engler, Pflanzenreich 4^{10}: 16, in part. 1900. Not *S. angustifolium* Michx. 1803.
Sparganium americanum Nuttallii Graebner, *loc. cit.* as a synonym. 1900.
Sparganium Nuttallii Engelm.; Graebner, *loc. cit.* as a synonym. 1900.
Sparganium simplex americanum Farwell, Ann. Rep. Mich. Acad. Sci. **6**: 202. 1904.

Perennial, with a rootstock and numerous roots at the base of the stem; stem stout, 3–7 dm. high; leaves deep-green, carinate, 3–10 dm. long, 6–12 mm. wide, more or less scarious-margined below; lower bracts similar, but shorter, ascending, more or less dilated and scarious-margined below; inflorescence usually simple, all heads sessile or the lower pistillate ones pedicelled, axillary, the latter sometimes on strict (not geniculate) branches bearing 1–2 staminate heads above; staminate heads at the end of the stem 3–10; fruiting heads 2–2.5 cm. in diameter; blades of the sepals cuneate-obovate, erose at the apex, gradually tapering into the broad claws; body of the achenes fusiform, brown, dull, 5–6 mm. long, 2–3 mm. thick; stipe 2–3 mm. long; beak 2–3 mm.; stigma oblong, seldom over 1 mm. long; anthers oblong, about 1 mm. long and one fourth as wide.

TYPE LOCALITY: Vicinity of Philadelphia.
DISTRIBUTION: Bogs and muddy shores, from Nova Scotia to South Carolina, Indian Territory, and Iowa.
ILLUSTRATIONS: Bull. Torrey Culb 15: *pl. 79, f. 7* (as *S. simplex*); Engler, Pflanzenreich 4^{10}: *f. 3 J* (as *S. angustifolium*).

6. **Sparganium lucidum** Fernald & Eames, Rhodora **9**: 87. 1907.

Sparganium simplex androcladum Engelm.; A. Gray, Man. ed. 5. 481, in part. 1867.

Perennial, with a rootstock; stem erect, stout, 7–10 dm. high; leaves strongly carinate, 3–6 dm. long, 5–12 mm. wide, firm, dark-green; inflorescence simple or somewhat branched; branches or heads axillary; bracts ascending, 2.5–4 dm. long; branches bearing one pistillate and sometimes 1–4 staminate heads, the main axis bearing 2–4 sessile pistillate and 6–10 staminate heads; sepals spatulate, two thirds as long as the achenes, rounded or truncate, slightly erose at the apex; fruiting heads about 3 cm. in diameter; achenes

olive-brown, shining; stipe short, about 1 mm. long; body fusiform, about 8 mm. long; beak 3–4 mm. long; stigma linear, 2.5–3.5 mm. long.

TYPE LOCALITY: Medford, Massachusetts.
DISTRIBUTION: Ponds and streams, from Massachusetts and New York to Missouri and Illinois.

7. **Sparganium simplex** Huds. Fl. Angl. ed. 2. 401. 1778.

Sparganium erectum β L. Sp. Pl. 971. 1753.

Perennial, with a rootstock and numerous roots at the base of the stem; stem stout, usually 2.5–7 dm. high; leaves light-green, below strongly triangular-keeled, acute, 5–9 dm. long, 8–15 mm. wide, often more or less scarious-margined below; bracts flat, slightly keeled; inflorescence usually simple; pistillate heads 2–5, the lowest one or two stalked, at least some of them supra-axillary; staminate heads 4–8; fruiting heads about 3 cm. in diameter; sepals spatulate, erose, more or less distinctly clawed; achenes brown or sometimes greenish-brown, shining; stipe 2–3 mm. long; body fusiform, often constricted at the middle, 5–6 mm. long; beak fully as long; stigma linear, about 2 mm. long; anthers oblong, about 1.5 mm. long, about one fourth as thick.

TYPE LOCALITY: Norwich, England.
DISTRIBUTION: Europe and northern Asia; in America apparently confined to Quebec and Ontario in the east and Washington and British Columbia in the west.
ILLUSTRATIONS: Engl. Bot. *pl. 745;* Fl. Dan. *pl. 932;* Baxter, Brit. Bot. *pl. 276;* Sv. Bot. *pl. 342;* Bild. Nord. Fl. *pl. 492;* Fl. Deuts. ed. 5. *pl. 132;* Engler, Pflanzenreich 4^{10}: *f. 3 K.*

8. **Sparganium chlorocarpum** Rydberg, sp. nov.

Perennial, with a creeping rootstock and numerous roots from the thickened portion at the base of the stem; stem slender, 3–6 dm. high, sometimes floating; leaves slender, 3–6 cm. long, 3–7 mm. wide, at least the middle ones keeled; bracts similar, ascending, only slightly if at all dilated or scarious at the base; inflorescence simple; pistillate heads 2–4, all sessile or the lowest one peduncled, some of them supra-axillary; staminate heads 3–7; fruiting heads 2–2.5 cm. in diameter; sepals two thirds as long as the achenes, spatulate-erose at the apex, the blades gradually tapering into the claws; achenes green, rather dull; stipe about 2 mm. long; body fusiform, 4–5 mm. long; beak about 4 mm. long; stigma about 1.5 mm. long.

Type collected in Emmet County, Iowa, in September, 1898, *Miss Alta Cratty* (herb. N. Y. Bot. Gard.).
DISTRIBUTION: Marshes and rivers, Western New York, Indiana, and Iowa.

9. **Sparganium diversifolium** Graebner, Schr. Nat. Ges. Danzig II. 9: 335. 1895.

Perennial; stem erect, 2.5–10 dm. high; leaves narrow, 3–5 mm. wide, abruptly acute, the lower altogether flat, without keel, with obsolete midrib, the upper convex on the back or in the lower part sharply keeled, flat toward the apex; inflorescence simple, the upper portion often drooping; pistillate heads 1–3, distant; staminate heads 1–6, distant; fruiting heads 2 cm. in diameter; sepals narrow, cuneate, tapering into a claw; achenes dark grayish-brown, with prominent nerves; body obovoid, tapering below into a short stipe, above abruptly contracted into the short beak; stigma lance-linear.

TYPE LOCALITY: West Prussia.
DISTRIBUTION: Central and northern Europe; also in Newfoundland, New Hampshire, and Minnesota, according to Graebner.
ILLUSTRATIONS: Schr. Nat. Ges. Danzig II. 9: *pl. 8, f. 1;* Engler, Pflanzenreich 4^{10}: *f. 4 F.*

10. **Sparganium acaule** (Beeby) Rydberg.

Sparganium simplex acaule Beeby; Macoun, Cat. Can. Pl. 5: 367. 1890.
Sparganium diversifolium nanum Graebner, in Engler, Pflanzenreich 4^{10}: 21. 1900.
Sparganium nanum Fries; Graebner, in Engler, Pflanzenreich 4^{10}: 21, as synonym. 1900.
Sparganium diversifolium acaule Fernald & Eames, Rhodora 9: 88. 1907.

Perennial; stem erect, 1–3 dm. high, strict; leaves erect, triangular-keeled, 2–4 dm. long, overtopping the stem, 2–4 mm. wide, cellular-reticulate; bracts almost erect, similar to the leaves, but dilated and broadly scarious-margined at the base; inflorescence simple; pistillate heads 1–3, crowded, usually all sessile, supra-axillary, rarely the lowest short-

stalked; staminate heads 2–4; fruiting heads about 1.5 cm. in diameter; sepals spatulate, erose at the apex, without distinction between blade and claw; achenes dark olive-brown, not nerved; stipe 1–2 mm. long; body fusiform, 3–4 mm. long, usually decidedly constricted at the middle; beak 1.5–2 mm. long; stigma about 1 mm. long; anthers about 1 mm. long and one fourth as thick.

TYPE LOCALITY: Lake Verde, Prince Edward Island.
DISTRIBUTION: Muddy shores and swamps, from Newfoundland to Virginia, Iowa, and South Dakota.

11. **Sparganium multipedunculatum** (Morong) Rydb. Bull. Torrey Club **32**: 598. 1905.

Sparganium simplex multipedunculata Morong, Bull. Torrey Club **15**: 79. 1888.
Sparganium subvaginatum Meinsh. Mél. Biol. Acad. St. Petersb. **13**: 390, in part. 1893.

Perennial, with a creeping rootstock; stem erect or sometimes floating, 3–5 dm. high, rarely only 1–2 dm. high; leaves 3–5 dm. long, 5–10 mm. (rarely 3–4 mm.) wide, of a firm texture, slightly keeled, dilated and scarious-margined towards the base, acute; bracts similar but still more dilated at the base; inflorescence usually simple; pistillate heads 2–5, the lower 1 or 2 decidedly peduncled, some of them supra-axillary; staminate heads 3–5, usually distant from the pistillate ones, but close to each other, the uppermost usually confluent; fruiting heads 1.5–2 cm. in diameter; sepals distinctly clawed, the blades spatulate, erose at the apex; achenes brown; stipe 2–2.5 mm. long; body fusiform, about 4 mm. long; beak 2.5–3 mm. long; stigma linear, about 1 mm. long; anthers about 1 mm. long, about one third as broad.

TYPE LOCALITY: Great Falls, Montana.
DISTRIBUTION: Ponds and marshes from British Columbia to California, Colorado, western Ontario, and Mackenzie.

12. **Sparganium angustifolium** Michx. Fl. Bor. Am. **2**: 189. 1803.

Sparganium natans angustifolium Pursh, Fl. Am. Sept. 34. 1814.
Sparganium simplex angustifolium Torr. Fl. N. Y. **2**: 249. 1843.
Sparganium natans affine A. Gray, Man. ed. 2. 430. 1856.
Sparganium affine Macoun, Cat. Can. Pl. 4: 71. 1888. Not *S. affine* Schnizl. 1845.
Sparganium subvaginatum Meinsh. Mél. Biol. Acad. St. Petersb. **13**: 390, in part. 1893.

Perennial, with a rootstock, usually somewhat thickened at the base of the stem; stem slender, in deep water floating, 3–12 dm. long, in shallow water occasionally erect, 2–3 dm. high; leaves 3–6 dm. long, 3–4 mm. wide, dark-green, cellular-reticulate beneath; lower bracts 1–2 dm. long, dilated and sometimes slightly scarious-margined below; the upper bracts short, lanceolate or ovate, 1–2 cm. long; peduncles usually arcuate-flexuose; pistillate heads 2–4, the lower 1 or 2 usually on supra-axillary pedicels 1–3 cm. long, the upper distant, in fruit about 1.5 cm. in diameter; sepals spatulate, short-clawed, erose at the apex, nearly two thirds as long as the achenes; achenes dirty-brown with reddish-brown bases, stipitate, beaked, constricted at or above the middle, abruptly contracted above; stipe about 1.5 mm. long; beak about 2 mm. long; stigma usually less than 1 mm. long; staminate heads 1–6, sometimes confluent with each other but distant from the pistillate ones; anthers oblong-clavate, 1 mm. long, 3–4 times as long as broad.

TYPE LOCALITY: Canada.
DISTRIBUTION: Ponds and slow streams, from Newfoundland to Connecticut, Pennsylvania, Colorado, California, and British Columbia.
ILLUSTRATIONS: Bull. Torrey Club 15: *pl. 79, f. 8;* Britt. & Brown, Ill. Fl. *f. 140* (as *S. simplex*).

13. **Sparganium fluctuans** (Morong) B. L. Robinson, Rhodora **7**: 60. 1905.

Sparganium simplex fluitans Engelm.; A. Gray Man. ed. 5. 481. 1867.
Sparganium androcladum fluctuans Morong, Bull. Torrey Club **15**: 78. 1888.

Perennial, with a rootstock and numerous roots at the base of the stem; stem slender, floating, 3–15 dm. long; leaves only slightly if at all carinate, 3–6 dm. long, 3–11 mm. wide, cellular-reticulate; bracts 3–12 cm. long, dilated and somewhat scarious-margined towards the base; inflorescence usually branched; branches usually with 1 pistillate and 2 staminate heads, the main axis with 2–4 staminate heads; fruiting heads about 2 cm. in diameter; sepals spatulate, erose at the apex, almost without a distinction between blade and claw; body of the brown achenes fusiform, sometimes constricted at the middle; stipe short; beak

about 2 mm. long, curved; stigma short, oblique, oblong; anthers oblong, about one third as broad as long.

TYPE LOCALITY: Ponds at the base of the White Mountains [New Hampshire].
DISTRIBUTION: Cold lakes and ponds, from Maine to Connecticut and Minnesota.
ILLUSTRATION: Bull. Torrey Club 15: *pl. 79, f. 6.*

14. **Sparganium minimum** Fries, Summa Veg. Scand. 2: 560. 1849.

Sparganium natans Oeder, Fl. Dan. 2[5]: 5. 1764. Not *S. natans* L. 1753.
Sparganium natans β L. Fl. Suec. ed. 2. 323. 1755.
Sparganium angustifolium A. Gray, Man. ed. 2. 430. 1856. Not *S. angustifolium* Michx. 1803.

Perennial, with a creeping rootstock, more or less thickened at the end; stem in deep water floating, 1–3 dm. (rarely 1 m.) long, in shallow swamps sometimes erect, in mud decumbent or ascending, much shorter; leaf-blades dark-green, 1–2 dm., in deep water sometimes 4 dm. long, 1.5–7 mm. wide, obtuse, flat; upper sheaths somewhat dilated but rarely scarious; peduncles somewhat bent; pistillate heads about equally distant, 1–3, axillary, the lowermost sometimes short-stalked, in fruit about 1 cm. in diameter; achenes greenish-brown, dull, broadly ellipsoid or obovoid, usually constricted below the middle, acute at both ends, sessile or rarely short-stipitate, short-beaked, the beak 0.5–1.5 mm. long; stigmas oblong, oblique; sepals spatulate, scarcely clawed, erose at the apex; staminate heads usually solitary, usually at some distance from the uppermost pistillate one; anthers short, about twice as long as broad.

TYPE LOCALITY: Sweden.
DISTRIBUTION: Labrador to New Jersey, Tennessee, Utah, Oregon, and Alaska; also in Europe and Asia.
ILLUSTRATIONS: Fl. Dan. *pl. 260* (as *S. natans*); Bot. Notiser 1852: *pl. 1, f. 2;* Fl. Deuts. ed. 5. *pl. 134;* Bull. Torrey Club 15: *pl. 79, f. 9;* Britt. & Brown, Ill. Fl. *f. 141;* Engler, Pflanzenreich 4[10]: *f. 5 A.*

15. **Sparganium Williamsii** Rydberg, sp. nov.

Perennial, with a horizontal rootstock; stem slender, ascending, about 3 dm. high; leaf-blades light-green, 1–3 dm. long, 3–4 mm. wide, obtuse, cellular-reticulate, especially the lower part; sheaths, especially those of the bracts, dilated and decidedly scarious-margined; peduncles strict; pistillate heads 3–4, the lower two usually on supra-axillary peduncles 1–3 cm. long, the upper sessile, in fruit 8–10 mm. in diameter; sepals oblanceolate, gradually tapering downward, erose at the apex, about half as long as the achenes; achenes yellowish-green, dull, ellipsoid, acute at both ends, sessile, usually somewhat constricted below the middle; beak fully 0.5 mm. long; stigma short, ovate; staminate heads usually solitary, confluent with the upper pistillate one, or on a very short stalk; anthers short, about half longer than broad.

Type collected at Klondike Bottom, Yukon Territory, in July, 1899, *R. S. Williams* (herb. N. Y. Bot. Gard.).

16. **Sparganium hyperboreum** Laest.; Beurl. Oefv. Sv. Vet.-Akad. Förh. 9: 192. 1852.

Sparganium natans submuticum Hartm. Handb. Skand. Fl. ed. 4. 312. 1843.
Sparganium submuticum Hartm. Handb. Skand. Fl. ed. 12. 108. 1889.
Sparganium angustifolium Meinsh. Mél. Biol. Acad. St. Petersb. 13: 396. 1893. Not *P. angustifolium* Michx. 1803.

Perennial, with a rootstock; stem slender, in deep water elongated, floating, sometimes 5 dm. long, in shallow water or mud decumbent or ascending, 1–2 dm. long; leaves light-green, flat or slightly round-keeled at the base, 1–4 mm. wide, in deep water sometimes 6 dm. long; sheaths slightly dilated but not scarious-margined; peduncle more or less flexuose; pistillate heads 2–4, the lower one or two usually stalked and supra-axillary, in fruit 8–10 mm. in diameter; achenes dark-yellow, dull, ellipsoid, acute at both ends, neither stalked nor beaked; stigmas sessile, irregularly nipple-shaped; sepals about half as long as the fruit, clawed; blades cuneate or cuneate-spatulate, truncate; staminate heads usually solitary, often close to the uppermost pistillate one; anthers short, about one and a half times as long as broad.

TYPE LOCALITY: Manu, Torne Lapmark, Sweden.
DISTRIBUTION: Greenland to Newfoundland, Hudson Bay, and Alaska; also in arctic and subarctic Europe and Asia.
ILLUSTRATIONS: Fl. Dan. *pl. 2792;* Bull. Torrey Club 15: *pl. 79, f. 10;* Engler, Pflanzenreich 4[10]: *f. 5 C.*

Order **NAIADALES**

By John Kunkel Small

Aquatic or marsh-inhabiting caulescent or acaulescent herbs with short or elongate rootstocks. Leaves alternate or opposite, flat or terete above the stipular base; blades present, narrow or broad, usually entire, rarely toothed or wanting, the phyllodia various in shape. Flowers perfect or unisexual and the pistillate ones rarely dimorphous, solitary or clustered in the leaf-axils, or spirally arranged in a spike or borne on a one-sided spadix. Perianth single or double, but imperfect, or obsolete or wanting. Androecium of 1–4 stamens; filaments very short or obsolete; anthers mostly 2–4-celled, usually with large, sometimes petaloid connectives. Gynoecium of a single carpel or of 2–several distinct or united carpels; ovary superior; style present or wanting; stigma disk-like, cup-like or elongate. Fruit drupelets or nutlets, or utricular.

Plants either monoecious or dioecious, the staminate or the pistillate flowers of one kind, or with perfect flowers; leaf-blades commonly flat above the stipular sheath.
- Gynoecium of distinct carpels. — Fam. 1. Zannichelliaceae.
- Gynoecium of one carpel or of united carpels.
  - Staminate and pistillate flowers borne alternately on a one-sided spadix, laterally attached. — Fam. 2. Zosteraceae.
  - Staminate and pistillate flowers borne in the leaf-axils.
    - Staminate flowers consisting of 2 anthers terminating an elongate pedicel; perianth wanting; stigmas filiform; acaulescent plants with entire leaf-blades. — Fam. 3. Cymodoceaceae.
    - Staminate flowers sessile or nearly so, consisting of an anther surrounded by the perianth; stigmas subulate; caulescent plants with spiny-toothed leaf-blades. — Fam. 4. Naiadaceae.

Plants with perfect, staminate and pistillate flowers borne in long-peduncled spikes and also pistillate flowers borne singly in the leaf-axils at the base of the plant; leaves terete above the stipular sheath. — Fam. 5. Lilaeaceae.

Family 1. ZANNICHELLIACEAE

By Norman Taylor

Perennial marine or fresh-water plants with floating or submerged leaves, or both. Leaf-blades petioled or sessile, capillary or expanded into a proper blade, or rarely reduced to terete phyllodia. Flowers perfect or monoecious, in sessile or pedunculed spikes, or in clusters in the axils of the leaves. Perianth none, but flowers sometimes enclosed in a hyaline sheath. Androecium of 1–4 stamens. Anthers extrorse, 1–2-celled, the connective sometimes becoming petal-like. Gynoecium of 1–4 distinct, 1-seeded carpels. Fruits mostly nut-like or drupe-like, sessile or stipitate. Endosperm wanting.

Flowers monoecious; stamen 1. 1. Zannichellia.
Flowers perfect; stamens more than 1.
Stamens 2; connective of the anther not dilated; fruit stipitate. 2. Ruppia.
Stamens 4; connective of the anther dilated and perianth-like; fruit sessile. 3. Potamogeton.

1. ZANNICHELLIA L. Sp. Pl. 969. 1753.

Stem simple or branched, submerged. Leaves all linear, submerged, entire. Stipules sheathing the leaf-bases, or free. Flowers axillary, monoecious, enclosed in a hyaline, deciduous spathe. Perianth none. Staminate flower of a single anther, on a short filament; anther 2-celled. Pistillate flowers 2–5; carpels flask-shaped, tapering into the short style; stigma cup-shaped, with dentate or angled edges. Mature fruit a stipitate, smooth or muricate nutlet. Embryo coiled at the cotyledonary end.

Type species, *Zannichellia palustris* L.

1. Zannichellia palustris L. Sp. Pl. 969. 1753.

Zannichellia intermedia Torr.; Beck, Bot. 385. 1833.

Stems slender, simple or branched; leaves all submerged, linear, capillary, 2–10 cm. long, acute or almost pungent at the apex, 1-nerved; stipules scarious, free from the leaf-bases, scarcely 2 cm. long; staminate and pistillate flowers in the same leaf-axil, subtended or enclosed by a hyaline bract; staminate flower of a single 2-celled anther on a slender filament; pistillate flowers of 2–10 carpels, sessile at first, often pedicellate after anthesis; carpels flask-shaped, ribbed or toothed on the margins, or sometimes smooth; style recurved, persistent; stigma cup-shaped, with dentate or angled edges; mature fruit 2–4 mm. long, rarely pitted.

Type locality: Europe.
Distribution: In fresh or brackish water nearly throughout North America, except the extreme north.
Illustrations: Ann. Sci. Nat. II. 9: *pl. 3, f. b;* E. & P. Nat. Pfl. 2^1: *f. 161 a–c;* Mem. Torrey Club 3^2: *pl. 64;* Britt. & Brown, Ill. Fl. *f. 178.*

2. RUPPIA L. Sp. Pl. 127. 1753.

Perennial marine or fresh-water herbs. Stems simple or branched, submerged. Leaves linear, entire, 1-nerved, acute at the apex, broader and sheathed at the base; stipular sheaths clasping the leaf-bases. Flowers perfect, terminating a spadix-like peduncle. Perianth none, but the flowers often enclosed in the sheathing leaf-bases when young. Stamens 2; anthers 2-celled, sessile. Carpels 4, sessile at first, at length stipitate; stigmas sessile, or at the end of a long or short style, peltate. Mature fruit on the end of a long pedicel which recoils after the fruit drops off. Drupelet oblique or equilateral, stipitate, crowned with the long or short style. Embryo curved, ovoid.

Type species, *Ruppia maritima* L.

Stipular sheaths 10 mm. long or less, the free part shorter. 1. *R. maritima.*
Stipular sheaths 15 mm. long or more, the free part as long. 2. *R. occidentalis.*

1. **Ruppia maritima** L. Sp. Pl. 127. 1753.

Ruppia curvicarpa A. Nelson, Bull. Torrey Club **26** : 122. 1899.
? *Ruppia pectinata* Rydb. Mem. N. Y. Bot. Gard. **1** : 18. 1900.

Stem whitish or green, simple or branched; leaves all submerged, thread-like, 0.3 mm. wide or less, 2–10 cm. long with an acute or more or less pungent apex; stipular sheath 6–10 mm. long, the free part much shorter or wanting; flowers on a short pedicel which elongates after anthesis, and is ultimately a loosely coiled spiral; stamens without a filament, early deciduous; anthers 2, sessile, 2-celled; mature carpels ovoid, equilateral, or gibbous and oblique, about 2 mm. long, stipitate; style short and stout, or finely attenuate, straight or hooked; pedicels of the fruit 1.3–3 cm. long.

TYPE LOCALITY: Europe.
DISTRIBUTION: Atlantic and Pacific coasts of North America, and in saline pools in the interior.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 62*; Britt. & Brown, Ill. Fl. *f. 176*; Engl. Bot. *pl. 136*; E. & P. Nat. Pfl. 2^1: *f. 161 e–g*.

Ruppia pectinata Rydb. is a species described as having an equilateral, not oblique, fruit and a style that is so short as to be almost wanting. These characters it has in common with many plants of *R. maritima* L., and it cannot be kept out of that species on these alone. Type specimen not seen by me.

2. **Ruppia occidentalis** S. Wats. Proc. Am. Acad. **25** : 138. 1890.

Ruppia lacustris Macoun, Cat. Can. Pl. 5 : 372. 1890.

Stem slender, with divaricately ascending branches; leaves all submerged and linear, 7–20 cm. long, less than 0.3 mm. wide; stipular sheaths 1.5–3 cm. long, the free part as long; flowers similar to the preceding; mature carpels pear-shaped, tipped by a straight style; pedicels of the fruit less than 2.5 cm. long.

TYPE LOCALITY: Kamloops, British Columbia.
DISTRIBUTION: From the type locality and from Nebraska.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 63*; Britt. & Brown, Ill. Fl. *f. 177*.

3. **POTAMOGETON** L. Sp. Pl. 126. 1753.

Peltopsis Raf. Jour. de Phys. **89** : 101. 1819.
Spirillus Gay, Compt. Rend. Acad. Sci. Paris **38** : 703. 1854.

Stems submerged or floating, simple or branched, the ends often thickening and forming propagating buds, which fall off and strike root. Leaves of two kinds, floating and submerged, in some species of great variability in width and length. Floating leaves coriaceous or semi-coriaceous, rarely semi-pellucid, usually expanded into a proper blade. Submerged leaves sometimes reduced to terete phyllodia, or with a broad or capillary leaf-blade. Stipules either free from the leaf-bases, or closely adnate to them. Inflorescence a simple or branched spike. Flowers perfect, usually thickly clustered on the sometimes interrupted spike. Perianth none. Stamens 4. Anthers 2-celled, the connective much enlarged and perianth-like. Gynoecium of 4 distinct, sessile, carpels. Ovules solitary in each carpel. Fruit an indehiscent nutlet. Embryo a complete or incomplete spiral, the curved or straight apex pointing towards or inside the base.

Type species, *Potamogeton natans* L.

1. **With floating and submerged leaves.** (Floating leaves rarely wanting in nos. 10, 11, and 12.)

A. Mature submerged leaves (or phyllodia) narrowly linear, or linear-lanceolate, never more than 4 mm. wide.
The straight apex of the embryo pointing towards the base or outside it.
Submerged leaves reduced to phyllodia; floating leaf-blades more than 3 cm. long.
Nutlets pitted; peduncles as thick as the petioles. 1. *P. natans*.
Nutlets smooth; peduncles twice as thick as the petioles. 2. *P. Oakesianus*.
Submerged leaves with a proper blade; floating leaf-blades less than 1.2 cm long. 3. *P. lateralis*.
The curved apex of the embryo pointing inside the base.
Embryo coiled once, the apex pointing downward. 4. *P. Vaseyi*.
Embryo coiled 1½ times, the apex transverse or pointing upward.
Floating leaf-blades less than 2.5 cm. long; submerged leaves without cellular reticulation along the midrib.
Submerged peduncles 4–6.5 mm. long; submerged leaves 0.4–0.9 mm. wide. 5. *P. diversifolius*.
Submerged peduncles 0.3–1.5 mm. long; submerged leaves 1–1.4 mm. wide. 6. *P. dimorphus*.

Floating leaf-blades more than 3.4 cm. long; submerged leaves with cellular reticulation along the midrib. 7. *P. epihydrus.*

B. Mature submerged leaves lanceolate, ovate or elliptic, never linear or less than 4 mm. wide except in forms of *P. heterophyllus.*

Keels of the fruit dentate or tuberculate. 8. *P. mexicanus.*

Keels of the fruit, if any, smooth.

Floating leaves 32–many-nerved. 9. *P. amplifolius.*

Floating leaves fewer-nerved.

Submerged leaves mostly 7-nerved, at least the lowest sessile.

Submerged leaves serrulate at apex. 10. *P. angustifolius.*

Submerged leaves entire.

Plant green; submerged leaves narrower than the floating. 11. *P. heterophyllus.*

Plant red; submerged leaves as wide as or wider than the floating. 12. *P. alpinus.*

Submerged leaves more than 7-nerved, all petiolate.

Floating leaf-bases merely rounded or acute, not cordate; submerged leaves as wide or nearly as wide as the floating.

Floating leaves elliptic-lanceolate, the apex acute or obtuse, not mucronate.

Floating leaves not spatulate.

Floating leaves rounded at base, the primary nerves mostly more than 5. 13. *P. americanus.*

Floating leaves acutely narrowed at base, the primary nerves mostly 5. 14. *P. occidentalis.*

Floating leaves spatulate. 15. *P. Faxoni.*

Floating leaves ovate, mucronate. 16. *P. illinoensis.*

Floating leaf-bases cordate or subcordate.

Nutlets prominently 3-keeled; style 1.5 mm. long. 17. *P. pulcher.*

Nutlets inconspicuously 1-keeled; style almost wanting. 18. *P. polygonifolius.*

2. With submerged leaves only.

A. Leaves of a lanceolate, ovate, or orbicular type, never linear.

Leaves stalked or merely sessile, not perfoliate.

Without propagating buds, the elliptic-ovate leaves serrulate only at apex. 19. *P. lucens.*

With propagating buds, the oblong-lanceolate leaves serrulate throughout. 20. *P. crispus.*

Leaves perfoliate.

Leaves cucullate; the straight apex of the embryo pointing towards the base. 21. *P. praelongus.*

Leaves not cucullate; the curved apex of the embryo pointing inside the base. 22. *P. perfoliatus.*

B. Leaves all linear.

Stipules adnate to the leaf-bases.

Leaves at least 1 mm. wide, with an acute, acuminate or obtuse tip.

Nutlets inconspicuously 1-keeled or without keels.

Leaves 3-nerved, 2 mm. wide or more. 23. *P. latifolius.*

Leaves 1-nerved, less than 1.5 mm. wide. 28. *P. interior.*

Nutlets 3-keeled.

Leaves serrulate; inflorescence branched. 24. *P. Robbinsii.*

Leaves entire; inflorescence not branched. 25. *P. interruptus.*

Leaves capillary, less than 0.5 mm. wide.

Nutlets 2.5 mm. long or more, style at least 0.5 mm. long. 26. *P. pectinatus.*

Nutlets 2 mm. long or less; style almost wanting.

Sheaths of stipules less than 6 mm. long. 27. *P. filiformis.*

Sheaths of stipules more than 1 cm. long. 28. *P. interior.*

Stipules free from the leaf-bases.

Leaves at least 1.6 mm. wide.

The straight apex of the embryo pointing towards the base.

Keels of the fruit crested. 35. *P. foliosus.*

Keels of the fruit smooth. 29. *P. Friesii.*

The curved apex of the embryo pointing inside the base.

Keels of the fruit undulate or toothed.

Without propagating buds; leaves 3-nerved. 30. *P. Hillii.*

With propagating buds; leaves many-nerved. 31. *P. compressus.*

Keels of the fruit smooth. 32. *P. obtusifolius.*

Leaves all capillary, less than 0.9 mm. wide.

Nutlets without keels or obscurely keeled.

Plant without propagating buds, the straight apex of the embryo pointing outside the base. 33. *P. rutilus.*

Plant with propagating buds, the curved apex of the embryo pointing inside the base. 34. *P. pusillus.*

Nutlets keeled, or at least with 2 grooves culminating in 3 ridge-like keels.

The straight apex of the embryo pointing towards or outside the base. 35. *P. foliosus.*

The curved apex of the embryo pointing inside the base.

Without propagating buds; keels of fruit dentate or crisped. 36. *P. confervoides.*

With propagating buds; keels of fruit, if any, smooth. 34. *P. pusillus.*

1. **Potamogeton natans** L. Sp. Pl. 126. 1753.

Potamogeton natans prolixus Koch, Syn. Fl. Germ. & Helv. ed. 2. 775. 1844.
Potamogeton floridanus Small, Fl. SE. U. S. 37. 1903.

Stem simple or sparingly branched, scarcely 1 m. long; floating leaves petioled; blades coriaceous, revolute, lanceolate-ovate or elliptic-ovate, 4.8–10.1 cm. long, 2.4–5.6 cm. wide, obtuse and mucronate or acute at the apex, cordate or narrowly acute at the base; petioles as long as the leaf-blades or longer; stipules 4–7 cm. long, acute, 2-keeled, axillary and free from the petiole; submerged leaves reduced to phyllodia, terete, scarcely 1.5 mm. thick and 10–25 cm. long, deciduous; spikes 3–5 cm. long, cylindric, densely-flowered; peduncles 3–9 cm. long, as thick as the petiole; nutlets pitted on both sides, grooved on the back; embryo an incomplete spiral, the straight apex pointing towards the base.

TYPE LOCALITY: Europe.
DISTRIBUTION: Nova Scotia to British Columbia, south to New Jersey, Pennsylvania, Missouri, Nebraska, and southern California; apparently in Florida (*P. floridanus*); also in Europe and Asia.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 25*; Britt. & Brown, Ill. Fl. *f. 142*; Engler, Pflanzenreich 4^{11}: *f. 13*; Linnaea 2: *pl. 6, f. 20*; Fl. Dan. *pl. 1025* (poor); Engl. Bot. *pl. 1822*.
P. floridanus Small is apparently an immature form of the above, with slender stem and leaves acute at both ends; mature fruit is unknown.

2. **Potamogeton Oakesianus** Robb. in A. Gray, Man. ed. 5. 485. 1867.

? *Potamogeton Purshii* Tuckerm. Am. Jour. Sci. II. 6: 228. 1848.

Stem sometimes much branched; floating leaves petioled; blades coriaceous, revolute, elliptic-lanceolate or ovate-lanceolate, acute at the apex, and acute, or rounded and subcordate, at the base, 3.2–4.9 cm. long, 1–2.8 cm. wide petioles mostly 2–3 times aslong as the leaf-blades or shorter; stipules acute, 2.5–4 cm. long, axillary and free from the petioles; submerged leaves reduced to phyllodia, terete, scarcely 1.5 mm. thick and often greatly elongated; spikes cylindric, 2–3.1 cm. long; peduncles 3–6 cm. long, twice thicker than the petioles; nutlets smooth on both sides, 3-keeled on the back; embryo an incomplete spiral, the apex pointing towards the base.

TYPE LOCALITY: Eastern Massachusetts.
DISTRIBUTION: Maine to Wisconsin, south to New Jersey.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 26*; Britt. & Brown, Ill. Fl. *f. 143*.

3. **Potamogeton lateralis** Morong, Bot. Gaz. **5**: 51. 1880.

Stem slender, much branched; floating leaves petioled; blades coriaceous, elliptic-lanceolate, acute or obtuse at the apex, narrowly decurrent at the acute base, 6.5–11 mm. long, 1.8–3.1 mm. wide; petioles as long as the leaf-blades or shorter; stipules axillary and free from the petioles, obtuse, 2.2–4 mm. long; submerged leaves capillary, 0.4–0.9 mm. wide, 1.8–3.4 cm. long; spikes 2.4–6 mm. long, few-flowered; peduncles 9–15 mm. long, as thick as the stem; nutlets smooth, 2-grooved on the back; embryo an incomplete spiral, the straight apex pointing directly towards the base.

TYPE LOCALITY: Dedham, Massachusetts.
DISTRIBUTION: Massachusetts and Connecticut.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 52*; Britt. & Brown, Ill. Fl. *f. 167*.

4. **Potamogeton Vaseyi** Robb. in A. Gray, Man. ed. 5. 485. 1867.

Potamogeton Vaseyi latifolius Morong, Mem. Torrey Club 3^2: 44. 1893.

Stem slender, much branched; floating leaves petioled; blades coriaceous, spatulate-ovate, 7–12 mm. long, 4–6 mm. wide, rounded at the apex, acute and narrowly decurrent at the base; petioles as long as the leaf-blades or shorter; stipules axillary and free from the petioles, acute, 3–5 mm. long; submerged leaves slender, capillary, 0.5–0.9 mm. wide, 2–3.6 cm. long; spikes sometimes interrupted, 5–11 mm. long; peduncles 5–14 mm. long, as thick as the stem; nutlets smooth or slightly pitted, 3-keeled; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Near Ringwood, McHenry County, Illinois.
DISTRIBUTION: Quebec to Wisconsin, south to southern New York.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 51*; Britt. & Brown, Ill. Fl. *f. 166*; Engler, Pflanzenreich 4^{11}: *f. 14 d–e*.

5. **Potamogeton diversifolius** Raf. Med. Repos. II. 5 : 354. 1808.

Potamogeton hybridus Michx. Fl. Bor. Am. 1 : 101. 1803. Not *P. hybridus* Thuill. 1799.
? *Potamogeton porcatum* Muhl. Cat. 18. 1813.
Potamogeton setaceus Pursh, Fl. Am. Sept. 120. 1814.
Potamogeton capillaceum Poir. in Lam. Encyc. Suppl. 4 : 535. 1816.
? *Potamogeton Zetterstedtii* Wallr. Bot. Zeit. 1 : 256. 1843.
Potamogeton diversifolius multi-denticulatus Morong, Mem. Torrey Club 3[2] : 48. 1893.
Potamogeton diversifolius tricophyllus Morong, Mem. Torrey Club 3[2] : 49. 1893.

Stem simple, or the submerged part much branched; floating leaves petioled; blades coriaceous, elliptic-ovate or oblong-lanceolate, obtuse or acute at the apex, narrowed into a slender petiole at the acute base, 4.5–11 mm. wide, 1.1–2.4 cm. long; petioles longer or shorter than the leaf-blades; stipules obtuse or truncate, free from the petiole, 4–9.3 mm. long; submerged leaves capillary or narrowly linear, 0.4–0.9 mm. wide, sometimes up to 4 cm. long; stipules as in the floating leaves, but mostly adnate to the petioles or leaf-bases; emersed spikes cylindric, 3.5–7 mm. long, the peduncles twice as long as the spike or longer, and as thick as the petioles of the floating leaves; submerged spikes shorter, subglobose, the peduncles 4–6.5 mm. long; nutlets deeply pitted and 3-keeled, the keels often bearing numerous bristles or teeth; embryo a complete spiral and coiled 1½ times, the curved apex pointing inside the base and upward.

TYPE LOCALITY: Carolina.
DISTRIBUTION: New Hampshire to California, south to Florida and northern Mexico. Also in Cuba.
ILLUSTRATIONS: Linnaea **2**: *pl. 5, f. 17;* Mem. Torrey Club 3[2]: *pl. 55;* Britt. & Brown, Ill. Fl. *f. 170.*

6. **Potamogeton dimorphus** Raf. Am. Mo. Mag. **1**: 358. 1817.

Potamogeton diversifolius Barton, Fl. Phila. Prodr. 27. 1815. Not *P. diversifolius* Raf.
Potamogeton diversifolius spicatus Engelm. Am. Jour. Sci. **42** : 102. 1844.
Potamogeton Spirillus Tuckerm. Am. Jour. Sci. II. **6**: 228. 1848.
Potamogeton Spirillus curvifolius Peck, Ann. Rep. N. Y. State Mus. **49** : 28. 1896.

Stem simple or much branched; floating leaves petioled; blades coriaceous, ovate-lanceolate or oblong-lanceolate, acute or obtuse at the apex, narrowed at the base, 1–2.5 cm. long, 3–8 mm. wide; petioles slender, about as long as the blades, or longer; stipules acute, axillary and free from the petioles, 3–11 mm. long; submerged leaves capillary, 1–1.4 mm. wide, 3–∞ cm. long, sometimes recurved; emersed spikes cylindric, up to 1 cm. long; peduncle 1–3 times as long as the spike; submerged spikes shorter, almost globose, sessile or nearly so; nutlets pitted and 3-keeled, the middle keel sometimes winged, but without teeth or bristles; embryo a complete spiral and coiled 1½ times, the curved apex pointing inside the base and upward.

TYPE LOCALITY: Pennsylvania.
DISTRIBUTION: Nova Scotia to Minnesota and California, south to Virginia and Missouri.
ILLUSTRATIONS: Barton, Fl. N. Am. 3*: pl. 84*, as *P. diversifolius;* Mem. Torrey Club 3[2]: *pl. 56;* Britt. & Brown, Ill. Fl. *f. 171*, both as *P. Spirillus.*

7. **Potamogeton epihydrus** Raf. Med. Repos. II. 5 : 354. 1808.

Potamogeton natans Michx. Fl. Bor. Am. 1 : 101. 1803. Not *P. natans* L. 1753.
Potamogeton Nuttallii Cham. & Schlecht. Linnaea 2 : 226. 1827.
Potamogeton Pennsylvanicus Cham. & Schlecht. Linnaea 2 : 227. 1827.
Potamogeton pumilus Wulfg.; R. & S. Syst. Veg. Mant. 3 : 354. 1827.
Potamogeton Claytoni Tuckerm. Am. Jour. Sci. **45** : 38. 1843.
Potamogeton Nuttallii ramosus Peck, Ann. Rep. N. Y. State Mus. **47** : 162. 1894.
Potamogeton Nuttallii cayugensis Wiegand, Rhodora **2** : 102. 1900.

Stem simple or branched; floating leaves petioled; blades elliptic-lanceolate, or rarely obovate, obtuse at the apex and narrowed at the acute base, 3.4–9 cm. long, 6–17 mm. wide; petioles 2.5–10 cm. long; stipules free from the petioles, obtuse, 1.8–2.7 cm. long; submerged leaves sessile, the blades linear or linear-lanceolate, 5-nerved, with a cellular reticulation along the midrib, 6–14 cm. long, 2.5–4 mm. wide; spikes cylindric, 1.2–6 cm. long, many-flowered; nutlets deeply pitted, 3-keeled, the middle keel sharp; embryo a complete spiral, the curved apex pointing inside the base and upward.

TYPE LOCALITY: Canada.
DISTRIBUTION: Newfoundland to British Columbia, south to North Carolina and Iowa.
ILLUSTRATIONS: Linnaea **2**: *pl. 6, f. 25;* Mem. Torrey Club 3[2]: *pl. 29;* Britt. & Brown, Ill. Fl. *f. 146;* Engler, Pflanzenreich 4[11]: *f. 15.*

8. **Potamogeton mexicanus** A. Benn. Jour. Bot. **25**: 289. 1887.

Stem simple; floating leaves petioled; blades coriaceous, elliptic-lanceolate, acute at both ends, 5.3–10 cm. long, 1.6–2.8 cm. wide, sometimes revolute; petioles as long as the blades or longer; stipules axillary and free from the petioles, 2.5–3.4 cm. long, acute; submerged leaves petioled; blades oblong-lanceolate or elliptic, acute or acuminate at the apex, narrowed at the acute base, 6.5–11 cm. long, 2.5–3.1 cm. wide; petioles as long as the blade or shorter; spikes cylindric, few-flowered, 3–3.5 cm. long; peduncle as thick as the petioles or thicker, 4–6.5 cm. long; nutlets 3-keeled, the middle keel denticulate, the smaller lateral keels tuberculate; embryo an incomplete spiral, the straight apex pointing directly toward the base.

TYPE LOCALITY: Valle de Myrica, Mexico.
DISTRIBUTION: Known only from the type locality and from San Luis Potosi.
ILLUSTRATION: Mem. Torrey Club 3^2: *pl. 33*.

9. **Potamogeton amplifolius** Tuckerm. Am. Jour. Sci. II. **6**: 225. 1848.

? *P. amplifolius ovalifolius* Morong; A. Benn. Jour. Bot. **42**: 70. 1904.

Stem simple or sparingly branched; floating leaves petioled; blades coriaceous, 32–40-nerved, ovate or elliptic-ovate, acute or acuminate at the apex, rounded or subcordate at the base, 6–10.5 cm. long, 2.7–5.1 cm. wide, in rare forms longer and wider; petioles 8–13 cm. long; stipules acute, 2-keeled, sometimes 10 cm. long, usually shorter; submerged leaves of two kinds, the upper elliptic or ovate, the lower lanceolate or sometimes falcate, 6–10.5 cm. long, 2.7–5.1 cm. wide; petioles 1–3.5 cm. long, usually winged; spikes cylindric, 2.5–4.9 cm. long, densely-flowered; peduncles 5–18 cm. long, twice as thick as the petioles of the floating leaves; nutlets smooth, 3-keeled, the middle keel larger than the lateral ones; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Cambridge, Massachusetts.
DISTRIBUTION: New Brunswick to British Columbia, south to Georgia and Nebraska; reported also from Florida and Alabama.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 27*; Britt. & Brown, Ill. Fl. *f. 144*.

10. **Potamogeton angustifolius** Berch. & Presl, Rostlin. 2: Alismac. 19. 1821.

Potamogeton heterophyllus elongatus Mert. & Koch, in Röhling, Deuts. Fl. ed. 3. 1: 845. 1823.
Potamogeton Zizii Roth, Enum. Pl. Germ. 1: 531. 1827.
Potamogeton lucens connecticutensis Robb. in A. Gray, Man. ed. 5. 488. 1867.
Potamogeton angustifolius methyensis Morong, Mem. Torrey Club 3^2: 30. 1893.
Potamogeton angustifolius connecticutensis A. Benn. Jour. Bot. **39**: 199. 1901.
Potamogeton Zizii porrectifolius A. Benn.; Asch. & Graebn. in Engler, Pflanzenreich 4^{11}: 83. 1907.
Potamogeton Zizii gracilis A. Benn.; Asch. & Graebn. in Engler, Pflanzenreich 4^{11}: 83. 1907.

Stems branching; floating leaves petioled, sometimes wanting; blades coriaceous, rarely somewhat translucent, elliptic-ovate or elliptic, acute or acuminate or sometimes mucronate at the apex, narrowed at the acute base, 3.5–9 cm. long, 1.5–3.8 cm. wide; petioles shorter than the blades or longer; submerged leaves sessile or the upper petiolate; blades pellucid, lanceolate or somewhat spatulate, and minutely serrulate towards the acute, sometimes cuspidate apex, 5–15 cm. long, 0.5–2.8 cm. wide, or rarely wider; primary nerves 7, sometimes with a few intermediate secondary nerves; stipules 2-keeled, obtuse, 1.3–3 cm. long, axillary and free from the petioles; spikes cylindric, 2.3–4.5 cm. long, densely flowered, rarely interrupted; peduncles as thick as the stem or thicker, 6–12 cm. long; nutlets smooth, 3-keeled when mature; embryo mostly an incomplete spiral, the apex pointing directly towards the base or sometimes inside it.

TYPE LOCALITY: Bohemia.
DISTRIBUTION: Maine to California, south to Florida, Mexico, and Guatemala; also in Europe.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 37*; Britt. & Brown, Ill. Fl. *f. 153* (as *P. Zizii*).
The varieties listed in the synonymy represent forms differing widely, but not persistently, from the type. The variations being of the vegetative rather than the reproductive organs, they can not be treated specifically.

Potamogeton varians Morong ; Fryer, Jour. Bot. **27**: 33. 1889. (*Potamogeton gramineus spathuliformis* Robb. in A. Gray, Man. ed. 5. 487. 1868. *Potamogeton spathulaeformis* Morong, Mem. Torrey Club 3^2: 26. 1893.) This is apparently a mere form of the preceding. The lack of mature fruit has suggested that it may be a hybrid (between *P. angustifolius* and *P. heterophyllus?*).

11. **Potamogeton heterophyllus** Schreb. Spicil. Fl. Lips. 21. 1771.

Potamogeton Proteus heterophyllus Cham. & Schlecht. Linnaea **2**: 202. 1827.
Potamogeton gramineus graminifolius Fries, Novit. ed. 2. 36. 1828. Not *P. gramineus* L. 1753.
Potamogeton gramineus myriophyllus Robb. in A. Gray, Man. ed. 5. 487. 1867.
Potamogeton gramineus Coulter, Man. Rocky Mt. Bot. 363. 1885. Not *P. gramineus* L.
Potamogeton heterophyllus maximus Morong, Bull. Torrey Club **13**: 155. 1886.
Potamogeton heterophyllus longipedunculatus Morong, Mem. Torrey Club 3^2: 24. 1893.
Potamogeton heterophyllus myriophyllus Morong, *loc. cit.* 1893.
Potamogeton heterophyllus minimus Morong, *loc. cit.* 25. 1893.

An exceedingly variable, and as here treated perhaps an aggregate species. Stem simple, or simply or dichotomously branched, sometimes up to 4 m. long; floating leaves petioled, sometimes wanting; blades coriaceous, ovate or elliptic-ovate, mostly acute or mucronate at the apex, narrowed or subcordate at the base, 1.5–6 cm. long, 0.7–2.5 cm. wide; petioles 3–10 cm. long, in some forms much longer; submerged leaves sessile, or the upper petiolate, translucent, varying from linear and capillary in some rare forms to lanceolate or oblanceolate in the commoner forms, mostly 7-nerved, or with fewer nerves, 1–2.5 cm. long, 2–18 mm. wide; stipules mostly spreading, obtuse, 1.5–2.5 cm. long; spikes cylindric, 2–4 cm. long, many-flowered; peduncles mostly twice as thick as the stem, from 4 cm.–1 m. long; nutlets slightly compressed or pitted, obscurely 3-keeled; embryo an incomplete spiral, the apex pointing directly towards the base or inside it.

TYPE LOCALITY: Lindenthal, Germany.
DISTRIBUTION: Throughout North America, except Central America and the West Indies; in the larger Bahama Islands; also in Europe.
ILLUSTRATIONS: Linnaea **2**: *pl. 5, f. 16, c, f, g and h*: Engler, Pflanzenreich 4^{11}: *f. 20 a–c* (as *P. gramineus*); Britt. & Brown, Ill. Fl. *f. 150*; Mem. Torrey Club 3^2: *pl. 34*; Fl. Dan. *pl. 1263*.

12. **Potamogeton alpinus** Balbis, Misc. 13. 1804.

Potamogeton rufescens Schrad.; Cham. Adnot. Fl. Berol. 5. 1815.
Potamogeton obrutus Wood, Class Book 178. 1845.

Whole plant reddish; stem simple or sparingly branched; floating leaves petioled, sometimes wanting; blades coriaceous, ovate-spatulate, obtuse at the apex, narrowed at the acute base, 2.5–3.5 cm. long, 0.8–1.3 cm. wide; petioles as long as the leaf-blades or longer; submerged leaves sessile, translucent; blades oblong-lanceolate or linear-lanceolate, 7–25 cm. long, as wide as or wider than the floating leaf-blades; stipules obscurely 2-keeled, axillary and free from the petiole, 2–3.5 cm. long; spikes cylindric, 1.5–3.2 cm. long, rarely becoming branched, many-flowered and -fruited; peduncles 5–18 cm. long, as thick as the stem; nutlets smooth, or pitted when young, 3-keeled, the middle keel obscurely winged and more prominent than the smaller lateral keels; embryo an incomplete spiral, the apex pointing towards the base or rarely inside it.

TYPE LOCALITY: Lake Chamollet, France.
DISTRIBUTION: Labrador west to the Yukon, south to Florida and California.
ILLUSTRATIONS: Fl. Dan. *pl. 1635*; Mem. Torrey Club 3^2: *pl. 30*; Britt. & Brown, Ill. Fl. *f. 147*; Engler, Pflanzenreich 4^{11}: *f. 17*; Engl. Bot. *pl. 1286* (as *P. fluitans*).

13. **Potamogeton americanus** Cham. & Schlecht. Linnaea **2**: 226. 1827.

Potamogeton fluitans Roth, Fl. Germ. **1**: 72, in part. 1788.
Potamogeton natans Thunb. Prodr. Fl. Cap. 32. 1794. Not *P. natans* L. 1753.
Potamogeton natans fluitans Torr. Fl. N. Y. **2**: 254. 1843.
Potamogeton lonchites Tuckerm. Am. Jour. Sci. II. **6**: 226. 1848.
Potamogeton plantagineus jamaicensis Griseb. Fl. Brit. W. Ind. 506. 1861.
Potamogeton lonchites noveboracensis Morong, Mem. Torrey Club 3^2: 20. 1893.
Potamogeton americanus noveboracensis A. Benn. Jour. Bot. **31**: 297. 1893.
Potamogeton rectifolius A. Benn. Jour. Bot. **40**: 147. 1902.
Potamogeton pennsylvanicus portoricensis Graebner, Symb. Ant. **4**: 73. 1903.

Stems slender, much branched; floating leaves petiolate; blades coriaceous, elliptic, 2–12 cm. long, 0.5–3.5 cm. wide, 17–24-nerved, acute at the apex and rounded or rarely

acutish at the base; petioles as thick as or a little thinner than the peduncles, 4–18 cm. long; submerged leaves petiolate; blades thin and pellucid, sometimes tinged with red, linear-lanceolate, 10–30 cm. long, as wide or nearly as wide as the floating leaf-blades, 7-nerved, sometimes with intermediary secondary nerves; stipules 2–10 cm. long, acute, acuminate or obtuse; spikes cylindric, 2–6 cm. long, many-flowered; peduncles thickening upward, as long as or much longer than the spike; nutlets smooth, 3-keeled, the middle keel prominent and sometimes slightly winged; embryo a complete spiral, the curved apex pointing just inside the base.

TYPE LOCALITY: Carolina.
DISTRIBUTION: Vermont to Washington, south to Virginia, southern California, Texas, and Mexico; also in Cuba, Haiti, and Jamaica.
ILLUSTRATIONS: Linnaea **2**: *pl. 6, f. 26;* Mem. Torrey Club 3[2]: *pl. 31;* Britt. & Brown, Ill. Fl. *f. 148* (the last two as *P. lonchites*).

14. **Potamogeton occidentalis** Sieber, Linnaea **2**: 224. 1827.

Potamogeton fluitans Roth, Fl. Germ. 1: 72, in part. 1788.

Stem simple or branched; floating leaves petioled; blades coriaceous, elliptic-lanceolate, acutely attenuate at both ends, 4–10 cm. long, 1.5–2.3 cm. wide; primary nerves mostly 5, but often with intermediary secondary ones; petioles as thick as the stem and up to 12 cm. long; submerged leaves petioled; blades translucent, elliptic-lanceolate, 6–12 cm. long, as wide as or a little wider than the floating leaf-blades, acute at both ends, petioles 0.5–4 cm. long; stipules acute or acuminate, 1.5–4 cm. long; spikes cylindric, 1–3.5 cm. long, many-flowered, sometimes interrupted; peduncles as thick as the petioles or thicker, 4–10 cm. long; nutlets smooth, 3-keeled, the middle keel often prominently winged on the upper half; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Santo Domingo.
DISTRIBUTION: Santo Domingo, Jamaica, Porto Rico, and Martinique.
ILLUSTRATION: Linnaea **2**: *pl. 6, f. 24.*

15. **Potamogeton Faxoni** Morong, Mem. Torrey Club 3[2]: 22. 1893.

Stem simple or branched; floating leaves petioled; blades obovate or spatulate, obtuse or rounded at the apex and narrowed at the acute base into a slender petiole, 3.5–8 cm. long, 1.3–3.2 cm. wide; petioles longer or shorter than the leaf-blades; submerged leaves petioled; blades translucent, oblong-lanceolate, acute at both ends, 3–11 cm. long, as wide or nearly as wide as the floating leaf-blades; primary nerves 7, with often several secondary and intermediate nerves; petioles slender, 1–4 cm. long; spikes cylindric, many-flowered, sometimes interrupted, 2.5–3.5 cm. long; peduncles thicker than the petioles, 4–12 cm. long; fruit unknown.

TYPE LOCALITY: In Lake Champlain, Ferrisburg, Vermont.
DISTRIBUTION: Known only from the type locality.
ILLUSTRATONS: Mem. Torrey Club 3[2]: *pl. 32;* Britt. & Brown, Ill. Fl. *f. 149.*

16. **Potamogeton illinoensis** Morong, Bot. Gaz. **5**: 50. 1880.

Stem branched; floating leaves petiolate; blades coriaceous, thick, ovate or elliptic-ovate, mucronate at the apex, rounded or subcordate at the base and sometimes decurrent, 8–14 cm. long, 4–8 cm. wide; petioles 6–10 cm. long, sometimes winged; submerged leaves petioled; blades mostly lanceolate-oblong, acute or acuminate at the apex and narrowed or sometimes decurrent at the base, 8–18 cm. long, as wide as or a little wider than the floating leaf-blades; petioles winged, 1–2.8 cm. long, rarely longer; stipules 2.5–4.5 cm. long, obtuse, 2-keeled; spikes cylindric, many-flowered, 2.5–4.8 cm. long; peduncles as thick as or thicker than the stem, 5–9 cm. long; nutlets smooth, 3-keeled, the middle keel sharper and more prominent than the smaller lateral ones; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Oquawka, Illinois.
DISTRIBUTION: Western Illinois and eastern Iowa.
ILLUSTRATIONS: Mem. Torrey Club 3[2]: *pl. 36;* Britt. & Brown, Ill. Fl. *f. 152.*

17. **Potamogeton pulcher** Tuckerm. Am. Jour. Sci. **45**: 38. 1843.

Potamogeton lucens fluitans Robb. in A. Gray, Man. ed. 2. 435. 1856.

Stem simple, rarely branched; floating leaves petioled; blades coriaceous, ovate or orbicular-ovate, acute or obtuse at the apex and cordate or subcordate at the base, 4–10 cm. long, 3–7 cm. wide; petioles as thick as the stem, 5–10 cm. long, rarely longer; submerged leaves petiolate; blades pellucid or semi-coriaceous, the upper lanceolate and the lower spatulate-ovate and sometimes narrowed into a winged petiole, 7–20 cm. long, much narrower than the floating leaf-blades; stipules 2-keeled, acuminate or obtuse, 2.5–5 cm. long; spikes cylindric, 2.3–4 cm. long, densely flowered, but the fruit rarely maturing; peduncles as thick as or a little thicker than the stem; nutlets smooth, 3-keeled, the middle keel more prominent than the lateral ones; style at least 2 mm. long; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Medford, Massachusetts.
DISTRIBUTION: Massachusetts to British Columbia, south to Georgia and Arkansas.
ILLUSTRATIONS: Engler, Pflanzenreich 4^{11}: *f. 16 k–m*; Mem. Torrey Club 3^{2}: *pl. 28*; Britt. & Brown, Ill. Fl. *f. 145*.

18. **Potamogeton polygonifolius** Pourr. Mém. Acad. Toul. **3**: 325. 1788.

Potamogeton oblongus Viv. Ann. Bot. 1^{2}: 102. 1804.

Stem simple or branched; floating leaves petioled; blades coriaceous, ovate or ovate-elliptic, 3.5–9 cm. long, 2.5–4 cm. wide, acute or acuminate at the apex, cordate or subcordate at the base; petioles as thick as the stem and as long or longer than the leaf-blades; submerged leaves petioled; blades translucent, 6–18 cm. long, 2.5–5 cm. wide, lanceolate, acute or obtuse at the apex and narrowed at the acute base; petioles slender, 4–12 cm. long; stipules acute, up to 4 cm. long, axillary and free from the petioles; spikes many-flowered, 2–3.5 cm. long; peduncles 3–4 times as long as the spike and slender; nutlets smooth, inconspicuously 1-keeled; style scarcely 0.5 mm. long; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Fontlaurier, France.
DISTRIBUTION: Whitbourne, Newfoundland.
ILLUSTRATIONS: Linnaea **2**: *pl. 6, f. 19*; Engler, Pflanzenreich 4^{11}: *f. 16 a–d, f.*

19. **Potamogeton lucens** L. Sp. Pl. 126. 1753.

Potamogeton proteus lucens Cham. & Schlecht. Linnaea **2**: 197. 1827.
Potamogeton lucens floridanus A. Benn.; Asch. & Graebn. in Engler, Pflanzenreich 4^{11}: 161. 1907.
Potamogeton malainus Asch. & Graebn. in Engler, Pflanzenreich 4^{11}: 83, as to the Guatemalan and Cuban plants. 1907.

Stem often much branched; leaves all submerged, petioled, or sometimes sessile; blades often shining, translucent, lanceolate, ovate or elliptic-ovate, rounded and mucronate or narrowly acute at the apex and rounded or acutely attenuate at the base, 6–16 cm. long, 2–4.5 cm. wide; margins crisped or serrulate at the apex; petioles 0.5–2 cm. long, sometimes wanting, often winged on the upper half; stipules axillary and free from the petioles, 2-keeled, 2–7 cm. long, obtuse; spikes 4.5–6 cm. long, many-flowered; peduncles as thick as or thicker than the stem, 6–14 cm. long; nutlets with a groove running inward from the base, thus apparently pitted, inconspicuously keeled; style scarcely 1 mm. long; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Europe.
DISTRIBUTION: Massachusetts to California, south to Florida, Mexico, and Costa Rica; Cuba; also in Europe.
ILLUSTRATIONS: Linnaea **2**: *pl. 5, f. 16 a, d*; Britt. & Brown, Ill. Fl. *f. 154*; Mem. Torrey Club 3^{2}: *pl. 38*; Fl. Dan. *pl. 195*; Engler, Pflanzenreich 4^{11}: *f. 18 a, d.*

20. **Potamogeton crispus** L. Sp. Pl. 126. 1753.

Stem mostly branched; leaves all submerged, sessile or semi-amplexicaul; blades oblong-lanceolate, crisped and serrulate on the margins, obtuse or acutish at the apex, 2–8.5 cm. long, 0.6–10 cm. wide, the midrib prominent, with 2 lateral and inconspicuous

nerves scarcely 1 mm. from it, the secondary nerves 2–5; stipules scarious, fugacious, usually splitting into shreds; propagating buds, in our forms, prominent in the axils of decayed leaves and at the ends of the branches; spikes cylindric, 1–1.8 cm. long; peduncles as thick as or thicker than the stem, often recurved in fruit; nutlets 3-keeled, the middle keel with a single spur-like projection near the base; style projecting at least 2 mm. from the body of the fruit; embryo an incomplete spiral, the straight apex pointing directly towards the base.

TYPE LOCALITY: Europe.
DISTRIBUTION: Ontario to Delaware and eastern Pennsylvania. Obviously introduced from the Old World.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 159*; Mem. Torrey Club 3^2: *pl. 44*; Fl. Dan. *pl. 927* (poor); Engl. Bot. *pl. 1012*; Engler, Pflanzenreich 4^{11}: *f. 23 a–c.*

21. **Potamogeton praelongus** Wolfg. Arch. Bot. Roem. 3: 331. 1805.

Potamogeton flexicaulis Dethard. (Strelitz. Anzeig. 1809: no. 50?); Koch, Syn. Fl. Germ. & Helv. 676. 1837.

Stem flattened, mostly branched; leaves all submerged, mostly perfoliate; blades bright-green, the apex cucullate and splitting when dry, lanceolate or lanceolate-oblong, 5–20 cm. long, 1.5–4 cm. wide, mostly broader below the middle; margins crisped; primary nerves 3–5 with secondary ones often intermediate, transverse nerves sometimes forming cellular reticulation along the midrib; stipules usually split into fine shreds when old, 4–35 mm. long; spikes cylindric or subglobose, 0.9–3 cm. long, many-flowered; peduncles as thick as the stem or thicker, 7–25 cm. long; nutlets smooth, 1-keeled or sometimes with 2 lateral and more inconspicuous keels; embryo an incomplete spiral, the straight apex pointing towards the base.

TYPE LOCALITY: Laiback river, Austria.
DISTRIBUTION: Massachusetts to British Columbia, south to Pennsylvania and California; also in Europe.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 39*; Britt. & Brown, Ill. Fl. *f. 155*; Linnaea **2**: *pl. 5, f. 14*; Engler, Pflanzenreich 4^{11}: *f. 22*.

22. **Potamogeton perfoliatus** L. Sp. Pl. 126. 1753.

Potamogeton crispus Darl. Fl. Cest. 23. 1826. Not *P. crispus* L. 1753.
Potamogeton perfoliatus lanceolatus Robb. in A. Gray, Man. ed. 5. 488. 1867.
Potamogeton perfoliatus Richardsonii A. Benn. Jour. Bot. **27**: 25. 1889.
Potamogeton Richardsonii Rydb. Bull. Torrey Club **32**: 599. 1905.
Potamogeton bupleuroides Fernald, Rhodora **10**: 46. 1908.

Stems branched; leaves all submerged, perfoliate; blades thin and translucent or thick and semi-coriaceous, orbicular, ovate or ovate-lanceolate, rounded or acute at the apex and always perfoliate at the base, 1–8.5 cm. long, 0.6–2.5 cm. wide; margins crisped or apparently sometimes smooth, rarely serrulate towards the apex; nerves 1–several, the midrib always prominent and sometimes the lateral nerves prominent also; stipules splitting into shreds, 0.2–2.5 cm. long, usually clasping the stem; internodes 1–10 cm. long; spikes cylindric, 0.5–2 cm. long; peduncles as thick as the stem, usually thickening upwards; nutlets with an indentation curving from the edge to the center of the face, thus apparently pitted, with a smooth or corrugated epicarp, obscurely 3-keeled, the middle keel more prominent than the lateral ones; embryo a complete spiral, the curved apex pointing just inside the base.

TYPE LOCALITY: Europe.
DISTRIBUTION: Throughout North America, except Mexico and the West Indies; reported from Guatemala; also in Europe.
ILLUSTRATIONS: Engler, Pflanzenreich 4^{11}: *f. 21, a–f*; Mem. Torrey Club 3^2: *pl. 40*; Britt. & Brown, Ill. Fl. *f. 156*; Engl. Bot. *pl. 168*.

Perhaps an aggregate species. Forms occur with lanceolate, acute-tipped leaves, reaching by numerous intergradations an orbicular type. Differences of marked, though inconstant, sort are found also in the venation of the leaf and the length of the stipules. But the vegetative characters are so fugitive, and the essential fruit characters so persistent, that there seems little warrant for the maintenance of the species listed in the above synonymy.

Potamogeton mysticus Morong, Bot. Gaz. **5**: 50. 1880. This is apparently a depauperate form of the above, confined to Mystic Pond, Medford, Massachusetts. It has never produced fruit and may be a hybrid.

23. **Potamogeton latifolius** (Robb.) Morong, Mem. Torrey Club 3^2: 52. 1893.

Potamogeton pectinatus latifolius Robb. in S. Wats. Bot. King's Expl. 338. 1871.

Stem whitish, branched; leaves all submerged, linear, with an acute or obtuse apex, 2.5–7 cm. long, 2–2.5 mm. wide; primary nerves 3–5 with numerous reticulated cross-nerves; stipules adnate to the leaf-bases, scarious, the sheath 1–2.5 cm. long, the free part shorter; spikes cylindric, 2–3 cm. long, interrupted below; peduncles whitish, thinner than the stem, 2.5–8 cm. long; nutlets smooth, mostly without keels, rarely with one inconspicuous keel; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Humboldt Mountains, Nevada.
DISTRIBUTION: Northwestern Nevada and northeastern California.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 59*.

24. **Potamogeton Robbinsii** Oakes, Mag. Hort. Hovey **7**: 180. 1841.

Stem slender, branched and sometimes rooting at the nodes; leaves all submerged, linear, minutely serrulate throughout, 8–13 cm. long, 2.5–4 mm. wide, apiculate or acute at the apex, somewhat clasping at the base, many-nerved; stipules adnate to the leaf-bases, the sheath 1–1.5 cm. long, the free part longer; peduncles 3–10 cm. long, usually branched, a little thinner than the stem; spike slender, 1–2 cm. long, many-flowered but sparingly-fruited; nutlets slightly pitted, 3-keeled, the middle keel larger than the lateral ones; embryo a complete or incomplete spiral, the apex pointing directly towards the base or inside it.

TYPE LOCALITY: New Hampshire.
DISTRIBUTION: Maine to British Columbia, south to Pennsylvania, and Washington.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 61*; Britt. & Brown, Ill. Fl. *f. 175*.

25. **Potamogeton interruptus** Kit.; Schultes, Oestr. Fl. ed. 2. **1**: 328. 1814.

Potamogeton flabellatus Bab. Man. Bot. ed. 3. 343. 1851.
Potamogeton pectinatus interruptus Aschers. Fl. Brand. **1**: 666. 1864.

Stem whitish, branched; leaves all submerged, linear, entire, 2–8.5 cm. long, 1–1.5 mm. wide, acute, acuminate or obtuse at the apex; primary nerves 1–5, rarely with a few cross-nerves; stipules adnate to the leaf-bases, the sheath 1–2 cm. long and not scarious except on the edges, the free part shorter, scarious; spikes 2–4.5 cm. long, interrupted, the flower clusters often 1 cm. apart; peduncles whitish, thinner than the stem, 3–7 cm. long; nutlets 3-keeled, the middle keel larger than the lateral ones; embryo a complete or incomplete spiral, the apex pointing towards or inside the base.

TYPE LOCALITY: Hungary.
DISTRIBUTION: Michigan, Wisconsin, Nebraska, and Saskatchewan; apparently in Guatemala.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 60*; Britt. & Brown, Ill. Fl. *f. 174*.
John Donnell Smith *4076*, from Guatemala, upon which Ascherson and Graebner (Pflanzenreich 4^{11}: 169) base the occurrence of *P. striatus* in North America, is apparently the above; mature fruit is unknown.

26. **Potamogeton pectinatus** L. Sp. Pl. 127. 1753.

Potamogeton angustissimus H.B.K. Nov. Gen. & Sp. **1**: 370. 1815.
Potamogeton pectinatus scoparius Wallr. Sched. Crit. 68. 1822.

Stem slender, much branched; leaves all submerged, capillary, often fasciculate, 2–15 cm. long, 0.1–0.3 mm. wide, with a more or less pungent point; stipules adnate to the leaf-bases, whitish, the sheath 1–2 cm. long, the free part shorter; spikes 1–3 cm. long, many-flowered, often interrupted; peduncles slender, 5–18 cm. long; nutlets at least 2.5 mm. long, with 2 obscure lateral keels but no median one; style projecting at least 0.6 mm. above the body of the fruit; embryo a complete or incomplete spiral, the apex pointing directly towards the base or inside it.

TYPE LOCALITY: Europe.
DISTRIBUTION: Throughout North America, except Central America and the West Indies; reported, however, from Panama; also in Europe.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 173*; Mem. Torrey Club 3^2: *pl. 58*; Engler, Pflanzenreich 4^{11}: *f. 28 a, b*.

27. **Potamogeton filiformis** Pers. Syn. Pl. 1: 152. 1805.

Potamogeton marinus L. Sp. Pl. 127, in part. 1753.
Potamogeton marinus Macounii Morong; Macoun, Cat. Can. Pl. 4: 88. 1888.

Stem slender, much branched, scarcely 5 dm. long; leaves all submerged, capillary, the apex more or less pungent, 5–20 cm. long, 0.2–0.4 mm. wide, mostly 1-nerved; stipules adnate to the leaf-bases, the sheath scarcely 5 mm. long, the free part scarious-margined and much longer; spikes slender, often much interrupted; peduncles very slender, 7–20 cm. long; nutlets scarcely 1.7 mm. long, smooth, mostly without keels, the style almost invisible; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Europe.
DISTRIBUTION: Quebec to the Northwest Territory, south to New York and Montana.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 57*; Britt. & Brown, Ill. Fl. *f. 172*; Linnaea 2: *pl. 4, f. 3*.

28. **Potamogeton interior** Rydb. Fl. Colo. 13. 1906.

Potamogeton marinus occidentalis Robb. in S. Wats. Bot. King's Expl. 339. 1871.
Potamogeton filiformis occidentalis A. Benn. Ann. Conserv. Jard. Genève 9: 102. 1905.

Stem slender, much branched and longer than in the preceding; leaves all submerged, capillary or narrowly linear, with an acute or more or less pungent apex, 5–15 cm. long, 0.3–1 mm. wide, mostly 1-nerved; stipules adnate to the leaf-bases, the sheath at least 1 cm. long, the free part shorter; spikes few-flowered, often interrupted, 1–3.5 cm. long; peduncles as thick as the stem, 3–18 cm. long; nutlets sometimes slightly pitted, without keels or inconspicuously 1-keeled; style almost invisible; embryo an incomplete spiral, the straight apex pointing directly towards the base.

TYPE LOCALITY: Ruby Lake, Nevada.
DISTRIBUTION: Ontario to the Northwest Territory, south to Utah and Colorado.

29. **Potamogeton Friesii** Rupr. Beitr. Pfl. Russ. Reich. 4: 43. 1845.

Potamogeton compressus Oeder, Fl. Dan. *pl. 203*. 1765. Not *P. compressus* L.
? *Potamogeton mucronatus* Schrad.; R. & S. Syst. Veg. 3: 517. 1818.
Potamogeton pusillus major Fries, Novit. ed. 2. 48. 1828.
Potamogeton major Morong, Mem. Torrey Club 3^2: 41. 1893.

Stem compressed, branched; leaves all submerged, linear, 4–7 cm. long, 2–3 mm. wide, the apex acute or obtuse, 5–7-nerved, and with 2 small glands at the base of the leaf; stipules axillary and free from the leaf-bases, 1.2–2.3 cm. long, whitish and many-nerved, acute or obtuse at the apex; spikes few-flowered, 1–4 cm. long, often interrupted; peduncles as thick as the stem, often thickening upwards, 2–4 cm. long; nutlets pitted, 3-keeled or without keels and with 2 distinct grooves on the back, the keels when present smooth; embryo an incomplete spiral, the straight apex pointing towards the base or outside it.

TYPE LOCALITY: Russia.
DISTRIBUTION: Nova Scotia to North Dakota, south to New York and Iowa.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 49*; Britt. & Brown, Ill. Fl. *f. 164*; Engler, Pflanzenreich 4^{11}: *f. 27 e* (as *P. mucronatus*); Engl. Bot. *pl. 418* (as *P. compressus*).

30. **Potamogeton Hillii** Morong, Bot. Gaz. 6: 290. 1881.

Stem slender, branched, without propagating buds; leaves all submerged, linear, acute, cuspidate or aristate at the apex, 2.5–6 cm. long, 2–2.8 mm. wide, with 2 glands at the base or glandless, 3-nerved, the lateral nerves less prominent than the midrib and remote from it; stipules scarious, 0.6–1.8 cm. long, aristate or rarely obtuse at the apex, axillary and free from the leaf-bases; spikes few-flowered; peduncles scarcely more than 1.5 cm. long, as thick as or a little thicker than the stem; nutlets smooth, 3-keeled, the middle keel prominent and undulate or crisped, the lateral keels inconspicuous; style projecting at least 1 mm. from the body of the fruit and crowned with a depressed-globose stigma; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: New York and Michigan.
DISTRIBUTION: New York to Michigan and Lake Superior, south to Pennsylvania and Missouri.
ILLUSTRATIONS: Bot. Gaz. 6: 291. *f. 3*; Mem. Torrey Club 3^2: *pl. 46*; Britt. & Brown, Ill. Fl. *f. 161*.

31. **Potamogeton compressus** L. Sp. Pl. 127. 1753.

Potamogeton zosteraefolius Schum. Enum. Pl. Saell. 1: 50. 1801.
Potamogeton complanatus Willd. Ges. Nat. Freunde Berlin Mag. 3: 297. 1809.
Potamogeton cuspidatus Schrad.; Smith, Engl. Fl. 1: 234. 1824.

Stems flattened, sometimes winged, branched, mostly with propagating buds; leaves all submerged, linear, 5–20 cm. long, 2–4 mm. wide, the apex acute, cuspidate, or obtuse; primary nerves 3, with numerous secondary and intermediary nerves; stipules scarious, axillary and free from the leaf-bases, fugacious, obtuse, 1–3.5 cm. long; spikes cylindric, many-flowered, often interrupted, 1–2.3 cm. long; peduncles as thick as the stem, 4–10 cm. long; nutlets smooth, 3-keeled, the lateral keels smaller than the toothed or undulate middle one; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Europe.
DISTRIBUTION: New Brunswick to British Columbia, south to New York and Oregon.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 45;* Britt. & Brown, Ill. Fl. *f. 160;* Linnaea **2**: *pl. 4, f. 10* (all as *P. zosteraefolius*); Engler, Pflanzenreich 4^{11}: *f. 24 a–c.*

32. **Potamogeton obtusifolius** Mert. & Koch; Roehling, Deuts. Fl. ed. 3. **1**: 855. 1823.

Potamogeton compressus Wahl. Fl. Suec. 1: 107. 1824. Not *P. compressus* L.

Stem slender, branched, sometimes with propagating buds; leaves all submerged, linear and with 2 glands at the base, acute or obtuse at the apex, 5–8 cm. long, 1.9–3 mm. wide, mostly 3–7-nerved, the midrib often compound; stipules whitish, scarious, often fugacious, obtuse or acute at the apex, 1.2–2 cm. long; spikes many-flowered, cylindric, 2–4 cm. long; peduncles as thick as the stem or thicker, 1.2–2.5 cm. long; nutlets very slightly pitted, 3-keeled, the middle keel prominent and smooth; style short, blunt; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Germany.
DISTRIBUTION: Quebec to Minnesota, south to northern New York and Kansas.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 163;* Mem. Torrey Club 3^2: *pl. 48;* Fl. Dan. *pl. 2107.*

33. **Potamogeton rutilus** Wolfg.; R. & S. Syst. Veg. Mant. 3: 362. 1827.

Stem slender, much branched, without propagating buds; leaves all submerged, capillary; with 2 glands at the base, 2.5–4.6 cm. long, 0.2–0.7 mm. wide, acute or more or less pungent at the apex, 3–5-nerved, the midrib often compound; stipules acute, 1–2 cm. long, or often longer than the internodes, axillary and free from the leaf-bases, sometimes splitting into shreds; spikes scarcely 1 cm. long, few-flowered, sometimes interrupted; peduncles as thick as the stem, 1–2.3 cm. long; nutlets smooth, without keels but sometimes obscurely grooved; embryo an incomplete spiral, the straight apex pointing outside the base.

TYPE LOCALITY: Vilna, Russia.
DISTRIBUTION: Quebec to Lake Superior, south to New York.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 165;* Engler, Pflanzenreich 4^{11}: *f. 27 f.*

34. **Potamogeton pusillus** L. Sp. Pl. 127. 1753.

Potamogeton pusillus vulgaris Fries, Novit. ed. 2. 48. 1828.
Potamogeton pusillus gemmiparus Robb. in A. Gray, Man. ed. 5. 489. 1867.
Potamogeton gemmiparus Morong, Bot. Gaz. **5**: 51. 1880.
Potamogeton pusillus polyphyllus Morong, Bot. Gaz. **5**: 51. 1880.
Potamogeton pusillus panormitanus A. Benn. Jour. Bot. **19**: 67. 1881.
Potamogeton pusillus Sturrockii A. Benn. Jour. Bot. **21**: 279. 1883.
Potamogeton pusillus elongatus A. Benn.; Macoun, Cat. Can. Pl. **5**: 371. 1890.
Potamogeton pusillus capilatus A. Benn. Jour. Bot. **39**: 201. 1901.
Potamogeton pusillus pseudo-rutilus A. Benn. Jour. Bot. **39**: 201. 1901.
Potamogelon strictifolius A. Benn. Jour. Bot. **40**: 148. 1902.

Stem slender, much branched, with propagating buds; leaves all submerged, linear or capillary, either slender and recurved or stiff and erect, 2–12 cm. long, 0.1–1.5 mm. wide, the apex obtuse, acute or mucronate, the base with 2 small glands; primary nerves 1–3, often reticulated between, or the whole leaf apparently nerveless; stipules axillary and

free from the leaf-bases, hyaline, 0.5–1.5 cm. long, the apex obtuse, or mucronate with the extreme tip aristate; spikes cylindric and interrupted or capitate; peduncles as thick as the stem or thinner, 1–5 cm. long, erect or recurved; nutlets smooth or ultimately pitted, distinctly 3-keeled, or without keels and with 2 grooves on the back of the nutlet, the keels or edges of the grooves smooth; style never exceeding 1 mm., straight or recurved; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Europe.
DISTRIBUTION: Nova Scotia to British Columbia, south to Louisiana, southern California, and northern Mexico.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 53, 54;* Britt. & Brown, Ill. Fl. *f. 168, 169;* Engl. Bot. *pl. 215;* Fl. Dan. *pl. 1451.*
The forms listed in the above synonymy are all more or less distinctly, if inconstantly, variable from the type. But the variations are all of a vegetative character, and therefore not sufficient for specific recognition.

35. **Potamogeton foliosus** Raf. Med. Repos. II. **5**: 354. 1808.

Potamogeton gramineus Michx. Fl. Bor. Am. **1**: 102. 1803. Not *P. gramineus* L. 1753.
? *Potamogeton exstipulatum* Muhl. Cat. 18. 1813.
Potamogeton pauciflorus Pursh, Fl. Am. Sept. 121. 1814.
Potamogeton niagarensis Tuckerm. Am. Jour. Sci. II. **7**: 354. 1849.
Potamogeton foliosus niagarensis A. Gray, Man. ed. 2. 435. 1856.
Potomogeton foliosus californicus Morong, Bot. Gaz. **10**: 254. 1885.
Potamogeton californicus Piper, Contr. U. S. Nat. Herb. 11: 98. 1906.

Stems flattened, much branched, very rarely with propagating buds; leaves all submerged, linear, 1.5–8 cm. long, 0.4–2 mm. wide, with an obtuse or more or less pungent apex, 3–5-nerved, the midrib prominent; stipules axillary and free from the leaf-bases, obtuse or acute, 1.3–2.4 cm. long; spikes few-flowered, usually not more than 12 nutlets maturing; peduncles usually 1–2 cm. long, as thick as or thicker than the stem; nutlets pitted, 3-keeled, the middle keel winged and more or less dentate; embryo an incomplete spiral, the apex pointing towards the base or outside it.

TYPE LOCALITY: Carolina.
DISTRIBUTION: New Brunswick to British Columbia, south to Florida and Mexico; also in Cuba, Porto Rico, and Jamaica.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 162;* Mem. Torrey Club 3^2: *pl. 47.*

36. **Potamogeton confervoides** Reichenb. Ic. Fl. Germ. **7**: 13. 1845.

Potamogeton trichoides A. Gray, Man. 457. 1848. Not. *P. trichoides* Cham. & Schlecht. 1827.
Potamogeton Tuckermani Robb. in A. Gray, Man. ed. 2. 434. 1856.
? *Potamogeton Curtisii* Morong, Bull. Torrey Club **13**: 145. 1886.

Stems very slender, branched, often dichotomous above, without propagating buds; leaves all submerged, linear or capillary, and very slender, 2.5–4 cm. long, scarcely 0.2 mm. wide, 1–3-nerved, usually with cross reticulations; stipules delicate, scarcely 5 mm. long, acute or obtuse and often splitting into shreds; spikes globose or subglobose, 5-8 mm. long, few-flowered; peduncles often branched, somewhat thicker upward, 2.5–12 cm. long; nutlets pitted, 3-keeled, the middle keel prominent and crisped or dentate; embryo a complete spiral, the curved apex pointing inside the base.

TYPE LOCALITY: Alleghany Mountains.
DISTRIBUTION: New England to New Jersey and Pennsylvania, apparently also in Florida (*P. Curtisii*).
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 158;* Mem. Torrey Club 3^2: *pl. 42.*
P. Curtisii Morong was described without the mature fruit having been seen. It is without distinctive vegetative characters, and the absence of fruit makes it impossible to determine its status accurately.

SPECIES NOT CERTAINLY NORTH AMERICAN

Potamogeton acutifolius Link; R. & S. Syst. Veg. 3: 513 (1818), is found at Lancaster, Pennsylvania, according to A. Bennett (Jour. Bot. 39: 200). A single specimen in the Munich Herbarium, supposed to have been collected by Muhlenburg, is cited. The species is unknown in America except for this. It is otherwise known from Asia and Australia.

Potamogeton coloratus Vahl, Fl. Dan. *pl. 1449* (1820), occurs in the Bahamas according to Ascherson and Graebner (in Engler, Pflanzenreich 4^{11}: 69). *Eggers 4080* from Hog Island and *Brace* (not *Bruce*) *395* are cited. The species is otherwise known from Asia, Africa, and Australia.

Potamogeton Leschenaultii Cham. & Schlecht. Linnaea 2: 223 (1827), may occur in Porto Rico according to Urban (Symb. Ant. 4: 72). *Sintenis 6670*, from Manati, is cited. This lacks fruit, but resembles *P. occidentalis* Sieber. The species is otherwise known from Teneriffe.

Potamogeton longifolius Gay; Poir. in Lam. Encyc. Suppl. 4: 535 (1816), occurs in Oregon according to A. Bennett (Ann. Hofmus. Wien 7: 290.) A single specimen is cited. The species is otherwise known from Africa and Australia.

Potamogeton nitens Weber, in Wigg. Prim. Fl. Holsat. Suppl. no. 11 (1787), occurs in New York, Massachusetts, and Michigan, according to A. Bennett (Jour. Bot. 39: 199). No fruiting material has ever been found in America. The species is otherwise exclusively Scandinavian.

Potamogeton strictus Philippi, Fl. Atacam. 50 (1860), is given by Ascherson and Graebner (in Engler, Pflanzenreich 4^{11}: 129) as occurring in Nicaragua. "*Bolandier*" (*Berlandier?*) *111* is cited. The species is otherwise known only from South America.

Potamogeton vaginatus Turcz. Bull. Soc. Nat. Mosc. 1837: 102 (1837), occurs in Saskatchewan and Northwest Territory, Canada, according to Macoun (Cat. Can. Pl. 4: 371). The specimen cited is *no. 3189*. The species is otherwise known from Europe and Asia.

EXCLUDED SPECIES

Potamogeton densus Beck, Bot. 386 (1833), is a *Philotria*.

Potamogeton pinnatum Walt. Fl. Car. 90 (1788), is *Myriophyllum pinnatum* (Walt.) B. S. P.

Potamogeton Liebmanni Buch. Abh. Nat. Ver. Bremen 3: 349 (1872), is *Heteranthera dubia* (Jacq.) MacM.

Family 2. **ZOSTERACEAE**

By Norman Taylor

Perennial marine plants with creeping rootstocks and flattened, branching stems. Leaves all alternate, 2-ranked, linear, flat or complicate, sheathing at the base. Flowers monoecious or dioecious, arranged on a one-sided spadix and enclosed in a close-fitting, ultimately rupturing spathe. Perianth none, but some of the flowers covered by a hyaline envelope. Staminate flower of a single, sessile, 1-celled anther. Pistillate flower of two united carpels, with a short or elongate style and 2 thread-like stigmas. Seeds ribbed or smooth. Embryo ovoid or ellipsoid.

Flowers monoecious; fruits rounded at the base. 1. Zostera.
Flowers dioecious; fruits deeply cordate-sagittate at the base. 2. Phyllospadix.

1. **ZOSTERA** L. Sp. Pl. 968. 1753.

Submerged marine perennials. Stem much branched. Leaves distichous, flat, linear, with sheathing stipuliform bases. Inflorescence a peduncled 1-sided spadix enclosed in a spathe. Flowers monoecious, arranged in 2 alternate rows on the spadix. Perianth none. Staminate flower consisting of a single, sessile, 1-celled anther, attached to the spadix. Pistillate flower of 2 united carpels. Style elongate and crowned with 2 thread-like stigmas. Mature fruit a flask-shaped utricle, rounded at the base. Seeds sulcate, the ribs showing through the testa. Embryo ellipsoid.

Type species, *Zostera marina* L.

1. **Zostera marina** L. Sp. Pl. 968. 1753.

Zostera marina latifolia Morong, Bull. Torrey Club **13**: 160. 1886.
Zostera oregana S. Wats. Proc. Am. Acad. **26**: 131. 1891.
Zostera pacifica S. Wats. Proc. Am. Acad. **26**: 131. 1891.
Zostera latifolia Morong, Mem. Torrey Club **3**[2]: 63. 1893.

Stems branched, 1–3 m. long, from a thick rootstock; leaves linear, distichous, 0.4–1.3 m. long, 3–13 mm. wide, obtuse at the apex, sheathing at the sessile base, entire or sparingly dentate; inflorescence a spadix, enclosed in a splitting sheath, bearing alternate staminate and pistillate flowers in 2 rows; staminate flowers consisting of a single stamen, mostly fugacious; pistillate flowers consisting of a single stalked or sessile ovary, with a slender style and two tapering subulate stigmas; mature carpels cylindric or flask-shaped, tipped with the persistent style, smooth or ribbed, according to age, 1–3 mm. long. Numerous sterile flowers occur with an apparently abortive perianth.

Type locality: Baltic Sea.

Distribution: Atlantic coast from Greenland to Florida; Pacific coast from Alaska to California; also in the Old World.

Illustrations: Mem. Torrey Club **3**[2]: *pl. 69, 71;* Britt. & Brown, Ill. Fl. *f. 183;* Engl. Bot. *pl. 467;* E. & P. Nat. Pfl. **2**[1]: *f. 155, 156.*

The characters upon which *Z. pacifica* S. Wats. (*Z. latifolia* Morong) were based seem scarcely sufficient to maintain the specific status of this western plant. Forms occur in the Pacific with both broad and narrow leaves and the lack of any well marked fruit characters makes it impossible to define satisfactory specific limitations.

The plant upon which Morong (Mem. Torrey Club **3**[2]: 63) bases the occurrence of *Zostera minor* (Cavol.) Nolte in Florida is *Cymodocea manatorum* Aschers.

2. **PHYLLOSPADIX** Hook. Fl. Bor. Am. **2**: 171. 1838.

Submerged salt-water perennials. Stems slender, much branched. Leaves linear, grass-like, with a sheathing base. Inflorescence a peduncled 1-sided spadix enclosed in a

sheathing spathe, which splits at maturity. Flowers dioecious, arranged in 2 rows on the spadix, each flower covered by a hyaline envelope. Perianth none. Staminate flower of a single, sessile, 1-celled anther. Pistillate flower of sessile carpels. Style short, crowned by 2 capillary stigmas. Mature fruit coriaceous, indehiscent, crowned by the short style at the apex and deeply cordate-sagittate at the base. Seeds membranous, globose, not sulcate.

Type species, *Phyllospadix Scouleri* Hook.

Leaves flat, at least 2 mm. wide. 1. *P. Scouleri.*
Leaves complicate, 1.5 mm. wide or less. 2. *P. Torreyi.*

1. **Phyllospadix Scouleri** Hook. Fl. Bor. Am. **2**: 171. 1838.

Phyllospadix serrulatus Rupr.; Aschers. Linnaea **35**: 169. 1867.

Stem winged, mostly simple, 1–4 dm. long; leaves all submerged, linear, flat 0.5–2 m. long, 2–4 mm. wide, entire, rarely serrulate, obtuse at the apex, sheathing at the base; primary nerves 3, with usually several intermediary secondary ones; inflorescence a spadix, 2–4 cm. long; spathe prominently winged, half enclosing the flowers; peduncles basal, simple, solitary or in 2's with sheathing basal bracts, 1–5 cm. long; staminate flower unknown; pistillate flower of sessile ovaries in 2 rows; style short, crowned with 2 slender stigmas; mature fruit ovate, 2–3 mm. long, 1-seeded, at the apex beaked with the persistent style and deeply cordate-sagittate at the base, with often 2 wings projecting downwards from the face of the fruit; seed globose, the testa thick. Numerous sterile flowers occur with staminodia-like appendages.

TYPE LOCALITY: Dundas Island, Columbia River.
DISTRIBUTION: Pacific coast from British Columbia to California.
ILLUSTRATIONS: Hook. *loc. cit. pl. 186;* Mem. Torrey Club 3^2: *pl. 73, 74, f. 1–2;* E. & P. Nat. Pfl. 2^1: *f. 157, 158.*

2. **Phyllospadix Torreyi** S. Wats. Proc. Am. Acad. **14**: 303. 1879.

Stems simple or branched, flat, 3 dm. or more long; leaves all submerged, linear, flat when very young, in maturity always complicate or truly terete, 0.8–2 m. long, 0.7–1.5 mm. wide, the apex obtuse or acute, the base sheathing; primary nerves 1–3, or sometimes the leaf-blades nerveless; inflorescence a curved or straight spadix, the spathe almost enclosing the flowers and splitting after anthesis; peduncles cauline, mostly branched, in 2's or 3's, mostly 3–14 cm. long, and with numerous fugacious bracts, the bracts scarious, obtuse or acute, 1–3.5 cm. long; staminate flowers numerous, in 2 rows, consisting of sessile, 1-celled anthers; pistillate flowers of sessile ovaries; mature fruit 1-seeded, flask-shaped, 2–3 mm. long, beaked by the persistent style at the apex, deeply cordate-sagittate at the base, with 2 projecting wings, and sometimes winged on the back; seeds of a reddish tint. Numerous sterile flowers occur.

TYPE LOCALITY: Santa Barbara, California.
DISTRIBUTION: Along the coast of California.
ILLUSTRATIONS: Mem. Torrey Club 3^2: *pl. 72, 74, f. 3–5;* Engler, Pflanzenreich 4^{11}: *f. 11.*

Family 3. CYMODOCEACEAE

By Norman Taylor

Submerged marine perennials. Rootstocks creeping, often rooting and articulated at the joints. Leaves all linear and grass-like, acute or obtuse at the apex, sheathing at the base. Flowers monoecious or dioecious, solitary or cymose, naked or rarely with minute hyaline bracts subtending the flowers. Staminate flowers of 2 long-pedicelled anthers equally or unequally attached. Anthers 2-celled, longitudinally dehiscent. Pistillate flowers of 2 united carpels, or of 1 carpel, sessile or sometimes stipitate. Style long or short, crowned with 1 or 2 thread-like stigmas. Mature fruit nut-like, 1-seeded. Seeds with a thick test, compressed or swollen. Embryo ovoid or ellipsoid, conforming to the shape of the seed.

Leaves terete or semi-terete, anthers equally attached, stigmas 2. 1. Cymodocea.
Leaves flat, anthers unequally attached, stigma solitary. 2. Halodule.

1. **CYMODOCEA** Konig, Ann. Bot. K. & S. 2: 96. 1805.

Submerged acaulescent, marine perennials, with creeping rootstocks. Leaves grass-like, terete in our species, acute at the apex and sheathing at the base, the sheaths more or less auriculate. Flowers dioecious, solitary or in simple or dichotomous cymes. Staminate flowers consisting of 2 anthers on the end of a long pedicel, the anthers equally attached, both the same height, 2-celled. Pistillate flowers of 2 carpels. Style crowned by 2 long, hair-like stigmas. Fruit a drupelet or nutlet, 1-seeded. Seeds pendulous, ovoid or oblong. Embryo conforming to the shape of the seed.

Type species, *Cymodocea aequorea* Konig.

1. **Cymodocea manatorum** Aschers. Sitz.-ber. Ges. Nat. Freunde Berlin 1868: 19. 1868. — Bot. Zeit. 26: 512. 1868.

Rootstock creeping, branching and rooting at the nodes; leaves all submerged, linear, terete or semi-terete, 4–35 cm. long, 0.8–2 mm. wide, acute or obtuse at the apex, ligulate at the base; stipular sheaths completely surrounding the leaf-bases, scarious, 1–4.5 cm. long; staminate flower consisting of 2 anthers at the end of a long pedicel; anthers 2-celled; pistillate flower of united carpels, without perianth, but subtended by a hyaline, perianth-like bract; style short; stigmas 2, slender; mature fruit 1-seeded, 3 mm. long and beaked by the persistent style.

Type locality: Cuba.
Distribution: Bermuda and Florida to Cuba and Martinique.

2. **HALODULE** Endl. Gen. 1368. 1841.

Diplanthera Thouars (Gen. Nov. Madagasc. 3; hyponym. 1806); Steinh. Ann. Sci. Nat. II. 9: 98. 1838. Not *Diplanthera* Banks & Solander. 1810.

Submerged marine perennials, with creeping rootstocks. Rootstocks articulated and rooting at the nodes. Leaves all linear, grass-like, more or less sheathing at the base. Flowers dioecious. Perianth none. Staminate flower consisting of 2 anthers attached to the end of a long pedicel, the pedicels sheathed at the base. Anthers unequally attached, one higher than the other, 2-celled. Pistillate flowers consisting of a single naked carpel. Style short, crowned with a slender, solitary stigma. Mature fruit small, globose.

Type species, *Diplanthera tridentata* Steinh.

1. **Halodule Wrightii** Aschers. Sitz.-ber. Ges. Nat. Freunde Berlin **1868**: 19. 1868. — Bot. Zeit. **26**: 511. 1868.

Diplanthera Wrightii Aschers. in E. & P. Nat. Pfl. Nacht. 37. 1897.

Rootstock creeping, rooting and sprouting at the nodes; leaves all submerged, linear, flat, less than 1 mm. wide, 3–40 cm. long, acute at the tip, ligulate at the base; stipular sheaths scarious, scarcely 3 cm. long; staminate flower of 2 anthers at the end of a long pedicel; anthers 2-celled, about 6 mm. long; pistillate flower of 1 naked carpel about 3 mm. long; style short; stigma solitary, slender; mature fruit black.

TYPE LOCALITY: Cuba.
DISTRIBUTION: Florida; Cuba to Martinique.

Family 4. **NAIADACEAE**

By Norman Taylor

Submerged marine or fresh-water herbs with fibrous roots and slender, branching stems. Internodes spiny or unarmed. Leaves alternate, opposite, or whorled, the blades linear, spiny on the margins or the back, or both, acute or obtuse at the apex, sometimes tipped with one or more subulate spines, sheathing at the base. Leaf-sheaths rounded or auriculate, entire or with spinulose teeth. The 2 intravaginal scales minute and hyaline. Flowers monoecious or dioecious, solitary in the axils. Staminate flowers with a double perianth-like envelope, the inner hyaline, the outer 4-horned or entire. Stamen 1, sessile. Anthers 1–4-celled. Pistillate flowers of a single pistil. Style short or wanting. Stigmas 2–4 and sometimes intermingled with 1–3 sterile, subulate, stigmoid processes. Fruit a sessile drupelet, the solitary seed filling the pericarp. The seed apparently smooth and shining, or reticulate with angled or roundish areolae. Embryo straight.

Containing only the following genus :

1. **NAIAS** L. Sp. Pl. 1015. 1753.

Characters of the family.
Type species, *Naias marina* L.

Flowers dioecious; internodes and back of the leaf spiny. 1. *N. marina.*
Flowers monoecious; internodes and back of the leaf unarmed.
  Leaf-sheaths merely rounded, not auriculate.
    Seeds shining; anthers 1-celled. 2. *N. flexilis.*
    Seeds reticulate; anthers 4-celled.
      Marginal spines minute, subulate. 3. *N. guadalupensis.*
      Marginal spines conspicuous, triangular. 4. *N. conferta.*
  Leaf-sheaths auriculate. 5. *N. gracillima.*

1. **Naias marina** L. Sp. Pl. 1015. 1753.

Naias marina gracilis Morong, Bot. Gaz. 10: 255. 1885.
Naias marina recurvata Dudley, Bull. Cornell Univ. 2: 104. 1889.
Naias marina californica Rendle, Trans. Linn. Soc. II. 5: 398. 1899.
Naias marina mexicana Rendle, Trans. Linn. Soc. II. 5: 398. 1899.
Naias gracilis Small, Fl. SE. U. S. 40. 1903.

Stems branched, sometimes dichotomously so, armed with brownish spinulose teeth on the internodes; leaves opposite or alternate, stiff or recurved, 0.5–3 mm. wide, 1–4.5 cm. long, with toothed margins and sometimes dorsally toothed on the midrib, the teeth usually triangular, apiculate, 1 mm. or more long; leaf-bases sheathing, the sheaths rounded, without teeth or rarely with a few short teeth; flowers dioecious; staminate flower 3–4 mm. long; anther 4-celled; pistillate flower usually 3–4 mm. long; stigmas 3, sometimes one shorter than the others; mature fruits apparently tesselated in dried specimens, smooth when fresh.

Type locality: Europe.
Distribution: New York to California, south to Florida, southern California, and Mexico; Cuba; also Europe Asia, and Australia.
Illustrations: Mem. Torrey Club 3^2: *pl. 65;* Britt. & Brown, Ill. Fl. *f. 179;* Trans. Linn. Soc. II. 5: *pl. 39, f. 1–9, 15, 26 and 30.*
The forms included under the names *gracilis* and *recurvata* are fairly well marked, but not specifically so. The rest are mere leaf-forms.

2. **Naias flexilis** (Willd.) Rost. & Schmidt, Fl. Sedin. 382. 1824.

Caulinia flexilis Willd. Mem. Acad. Berlin **1798**: 89. 1801.
Naias canadensis Michx. Fl. Bor. Am. **2**: 220. 1803.
Naias flexilis robusta Morong, Bot. Gaz. **10**: 255. 1885.

Stem slender, branched, often dichotomously so, elongate or sometimes short and densely bushy; leaves all submerged, linear, 0.8–2.5 cm. long, 0.5 mm. wide, or sometimes wider, erect or often recurved; marginal teeth 20–30, prominent; leaf-sheaths rounded, not auriculate, toothed; flowers monoecious; staminate flower 2.5–3 mm. long, the anther 1-celled; pistillate flower 1–2.5 mm. long, the stigmas 2–4, usually 3, subulate; seed ellipsoid, apparently smooth and shining, but under a strong lens reticulate with minute 6-sided areolae.

TYPE LOCALITY: Pennsylvania.
DISTRIBUTION: Quebec to British Columbia, south to Florida and Texas.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 180*; Mem. Torrey Club 3^2: *pl. 66*; E. & P. Nat. Pfl. 2^1: *f. 165 h*; Trans. Linn. Soc. II. **5**: *pl. 40, f. 92–98*.

3. **Naias guadalupensis** (Spreng.) Morong, Mem. Torrey Club 3^2: 60. 1893.

Caulinia guadalupensis Spreng. Syst. **1**: 20. 1825.
Naias flexilis fusiforme Chapm. Fl. S. U. S. 444. 1860.
Naias flexilis guadalupensis A. Br. Jour. Bot. **2**: 274. 1864.
Naias microdon A. Br. Sitz.-ber. Ges. Nat. Freunde Berlin **1868**: 17. 1868.—Bot. Zeit. **26**: 510. 1868.
Naias microdon guadalupensis A. Br. *loc. cit.* 1868.
Naias microdon curassavica A. Br. *loc. cit.* 1868.
Naias guadalupensis curassavica Magnus & Rendle, Symb. Ant. **4**: 74. 1903.

Stem slender, branched; leaves all submerged, linear, 1–2.5 cm. long, 0.4–1.7 mm. wide, acute or obtuse at the apex, and usually tipped with 1 or 2 spines, sheathing at the base; marginal teeth inconspicuous, 20–40, often apparently wanting; leaf-sheaths sloping or rounded, not auriculate, spinulose; flowers monoecious; staminate flowers 2–3 mm. long, the anthers 4-celled; pistillate flowers 2–3 mm. long; mature fruit crowned with 2 or 3 stigmas and usually with 1 or 2 spiny, sterile, stigmatic processes, thus apparently with 3–5 stigmas; seeds ellipsoid, reticulate with numerous 4-sided areolae.

TYPE LOCALITY: Island of Guadeloupe.
DISTRIBUTION: Pennsylvania to Oregon, south to Florida, Mexico, and Central America; Cuba; Porto Rico; Jamaica; Guadeloupe.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 181*; Mem. Torrey Club 3^2: *pl. 67*.

4. **Naias conferta** A. Br. Sitz.-ber. Ges. Nat. Freunde Berlin **1868**: 17. 1868.—Bot. Zeit. **26**: 510. 1868.

Naias arguta conferta A. Br. Jour. Bot. **2**: 277. 1864.
Naias Wrightiana A. Br. Sitz.-ber. Ges. Nat. Freunde Berlin **1868**: 17. 1868.
Naias Wrightiana laxa A. Br. *loc. cit.* 1868.

Stem slender, much branched, elongate or shortened; leaves all submerged, 1.2–2 cm. long, 0.4–0.5 mm. wide, acute, at the apex and tipped with a single subulate spine; leaf-margins with 16–40 conspicuous triangular teeth, the teeth spinulose; leaf-sheaths rounded, not auriculate, with spiny teeth; flowers monoecious; staminate flower of a single 4-celled anther; pistillate flower naked, ovoid; stigmas 2, and without intermingling sterile stigmatic processes; fruit narrowly ellipsoid, 1–2 mm. long; reticulations of the seed-coat numerous, 4-sided.

TYPE LOCALITY: Cuba.
DISTRIBUTION: Cuba, and in tidal creeks, Milton, Florida.
ILLUSTRATION: Trans. Linn. Soc. II. **5**: *pl. 40, f. 68–77* (*68–74*, as *N. Wrightiana*).

5. **Naias gracillima** (A. Br.) Magnus, Beitr. Gatt. Najas 23. 1870.

Naias indica gracillima A. Br.; A. Gray, Man. ed. 5. 681. 1868.

Stem slender, capillary, much branched; leaves all submerged, capillary, apparently though not truly terete, opposite or fasciculate, 1–2.8 cm. long, scarcely 0.2 mm. wide; margins with about 20 minute teeth, the lower part essentially entire; sheaths sharply

auriculate, the lobes toothed; flowers monoecious; staminate flower with a single 1-celled anther; pistillate flower about 2 mm. long; stigmas 2; mature fruit oblong-cylindric, reticulate with longitudinal rows of oblong areolae.

TYPE LOCALITY: Albany, New York.
DISTRIBUTION: Massachusetts to Missouri, south to New Jersey and Pennsylvania.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 182;* Mem. Torrey Club 3^2: *pl. 68;* Trans. Linn. Soc. II. 5: *pl. 41, f. 122–125.*

Family 5. LILAEACEAE

By Norman Taylor

Acaulescent, annual, marsh or salt-water plants, with radical, terete, sheathing leaves, the sheaths often containing minute, hyaline scales of inconstant shape. Flowers perfect or unisexual, basal, or in scapose, naked or bracted, spicate inflorescences. Perianth none. Basal flowers enclosed by the sheathing leaf-bases, exclusively pistillate; carpels solitary, 1-seeded, tipped by a long, slender style and a capitate stigma; fruit a ribbed caryopsis; the seed oblong-conical, with a membranous test. Scapose inflorescences of staminate, pistillate and perfect flowers irregularly disposed on a spike; staminate flowers of a single, sessile, 2-celled anther, the connective dilated and bract-like; pistillate flowers of single, 1-seeded carpels, subtended by a bract or bractless, the lower with a long style, the upper with shorter styles, the stigmas papillose; fruit a winged caryopsis, the seeds similar to those of the basal flowers, but smaller; perfect flowers with androecium and gynoecium similar to those in the unisexual flowers, but united at the base.

Containing the single monotypic genus:

1. LILAEA H. & B. Pl. Aequin. **1**: 222. 1808.

Heterostylus Hook. Fl. Bor. Am. **2**: 171. 1838.

Characters of the family.

Type species, *Lilaea subulata* H. & B.

1. **Lilaea subulata** H. & B. Pl. Aequin. **1**: 222. 1808.

Heterostylus gramineus Hook. Fl. Bor. Am. **2**: 171. 1838.

Acaulescent; leaves acute at the apex, 5–35 cm. long, 1–4.5 mm. thick, stipular sheaths hyaline, 4–10 cm. long, usually striate. Basal flowers pistillate, naked, of a single carpel; styles elongate, up to 20 cm. long or longer, crowned with a capitate stigma; mature fruits 4–6.5 mm. long, ribbed. Scapose flowers spicate, the scape terete, 4–20 cm. long; spikes 0.5–4.5 cm. long, usually many-flowered; staminate flowers of a single, sessile anther, the connective dilated, oblong-cuspidate and bract-like; pistillate flowers of a single 1-seeded carpel, 1.5–4 mm. long, bracted or bractless, the styles 6 mm. long or longer in the lower flowers, much shorter in the upper flowers; mature fruits smaller than the basal fruits, winged. Perfect flowers occur throughout the spike with androecium and gynoecium similar to those of the unisexual flowers, but united at the base, bractless.

Type locality: Santa-Fé de Bogota.

Distribution: British Columbia south to Mexico; also in South America.

Illustrations: H. & B. *loc. cit. pl. 63;* Hook. *loc. cit. pl. 189* (as *Heterostylus gramineus*); Schnizl. Icon. **1**: *pl. 49;* E. & P. Nat. Pfl. **2**[1]: *f. 172;* Lam. Encyc. *pl. 993;* Mem. Torrey Club **3**[2]: *pl. 24.*

Order **ALISMALES**

By John Kunkel Small

Marsh-inhabiting or aquatic, usually acaulescent herbs, with more or less elongate rootstocks which are often tuber-bearing, the scapes and petioles rush-like or with spongy tissues. Leaves alternate, usually basal; blades narrow or broad, often with basal lobes, or wanting, the phyllodia slender, thick or flat. Flowers perfect, monoecious, or dioecious, borne in spikes, racemes, or panicles. Perianth single or double. Calyx of 3 herbaceous sepals. Corolla of 3 usually tender petals, or wanting. Androecium of 3–6 stamens or more; filaments long or short, but manifest; anthers with inconspicuous connectives. Gynoecium of 3–many distinct carpels which are sometimes coherent during anthesis; ovary superior; style stout or slender; stigma disk-like or minute. Fruit a head of achenes, or follicular or capsular.

Carpels 1- or few-ovuled, one ovule basal, the others borne in the inner angle of the ovary-cavity.
- Sepals and petals nearly similar, or the petals wanting; carpels coherent during anthesis, at maturity forming a capsular or a follicular fruit. Fam. 1. Scheuchzeriaceae.
- Sepals and petals very dissimilar; carpels distinct, at maturity forming a head or a whorl of achenes. Fam. 2. Alismaceae.

Carpels many-ovuled, the ovules scattered over the inner surface of the ovary-cavity. Fam. 3. Butomaceae.

Family 1. SCHEUCHZERIACEAE

By Nathaniel Lord Britton

Perennial marsh herbs with rush-like leaves and small spicate or racemose perfect flowers. Perianth 4–6-parted, its segments in two series, persistent or deciduous. Stamens 3–6. Filaments very short or elongate. Anthers mostly 2-celled and extrorse. Carpels 3–6, 1–2-ovuled, more or less united until maturity, dehiscent or indehiscent; stigmas sessile or nearly so. Seeds 1 or 2 in each carpel, anatropous. Embryo straight.

Leaves all basal; flowers numerous on naked scapes, ebracteate, spicate or in spike-like racemes. 1. Triglochin.
Stem leafy; flowers few in a loose raceme. 2. Scheuchzeria.

1. TRIGLOCHIN L. Sp. Pl. 338. 1753.

Marsh herbs with basal half-rounded ligulate leaves with membranous sheaths. Flowers in terminal spikes or racemes on long, naked scapes. Perianth-segments 3–6, concave, the three inner ones inserted higher up than the outer. Stamens 3–6; filaments short; anthers oval, 2-celled, sessile or nearly so, inserted at the base of the perianth-segments and attached by their backs. Ovaries 3–6, united, each 1-celled, sometimes abortive; ovules solitary, basal, erect, anatropous. Style short or none. Stigmas as many as the ovaries, plumose. Fruit of 3–6 cylindraceous, oblong or obovoid carpels, which are distinct or connate, coriaceous, costate, when ripe separating from the base upward from a persistent central axis, dehiscing by the ventral suture. Seed erect, cylindraceous or ovoid-oblong, compressed or angular.

Type species, *Triglochin palustris* L.

Carpels 3.
Fruit linear or clavate, tapering to a subulate base. 1. *T. palustris.*
Fruit globose-trigonous. 2. *T. striata.*
Carpels 6; fruit oblong or ovoid, obtuse at the base. 3. *T. maritima.*

1. Triglochin palustris L. Sp. Pl. 338. 1753.

Rootstock short, oblique, with slender fugacious stolons. Leaves linear, shorter than the scapes, 12–30 cm. long, tapering to a sharp tip; ligule very short; scapes 1 or 2, slender, striate, 0.2–0.6 m. high; racemes 12–30 cm. long; pedicels capillary, in fruit erect-appressed and 5–7 mm. long; perianth-segments 6, greenish-yellow; anthers 6, sessile; pistil of 3 united carpels, 3-celled, 3-ovuled; stigmas sessile; fruit 6–7 mm. long, about 1.5 mm. thick, linear or clavate; ripe carpels separating from the axis and hanging suspended from its apex, the axis 3-winged.

Type locality: Europe.

Distribution: Greenland to Alaska, south to Maine, New York, Pennsylvania, and Indiana; in the Rocky Mountains to southern Colorado and Washington; also in southern South America, Europe, and Asia.

Illustrations: Britt. & Brown, Ill. Fl. *f. 184;* Mem. Torrey Club 3: *pl. 20;* Fl. Dan. 3: *pl. 490;* Benth. Ill. Handb. Brit. Fl. 2: *f. 963;* Baxter, Brit. Bot. 1: *pl. 60;* Schnizl. Icon. *pl. 49, f. 10–12;* Coste, Fl. Fr. *f. 3701;* Pratt, Fl. Pl. Great Brit. 3: *pl. 233, f. 6;* Bild. Nord. Fl. *pl. 486, A;* Sv. Bot. 2: *pl. 111;* Sturm, Deuts. Fl. 13: *pl. 9.*

2. Triglochin striata R. & P. Fl. Per. 3: 72. 1802.

Triglochin triandra Michx. Fl. Bor. Am. 1: 208. 1803.
Triglochin mexicana H.B.K. Nov. Gen. & Sp. 1: 244. 1815.

Rootstocks upright or oblique. Scapes 1 or 2, more or less angular, usually not over 0.3 m. high; leaves slender, slightly fleshy, nearly or quite as long as the scapes, 0.5–2 mm. wide; flowers very small, light-yellow or greenish, in narrow racemes; pedicels 1–2 mm. long, not elongating in fruit; perianth-segments 3; oval or ovate, obtuse, less than 1

mm. long; stamens 3; anthers oval, large; pistil of 3 united carpels; fruit subglobose or somewhat obovoid, about 2 mm. in diameter, mostly thicker than long, appearing 3-winged when dry by the contracting of the carpels; carpels coriaceous, rounded and 3-ribbed on the back; axis broadly 3-winged.

TYPE LOCALITY: Surco, Peru.
DISTRIBUTION: Maryland to Florida and Louisiana; middle and southern California; Mexico; also in South America.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 185;* Mem. Torrey Club **3**: *pl. 21.*

3. **Triglochin maritima** L. Sp. Pl. 338. 1753.

Triglochin elata Nutt. Gen. **1**: 237. 1818.
Triglochin maritima elata A. Gray, Man. ed. 2. 437. 1856.
Triglochin maritima debilis M. E. Jones, Proc. Calif. Acad. II. **5**: 723. 1895.
Triglochin concinna Davy, Erythea **3**: 117. 1895.

Rootstock without stolons, often subligneous, the caudex thick, mostly covered with the sheaths of old leaves. Scape stout, nearly terete, 0.1–0.7 m. high; leaves half-cylindric, usually about 2 mm. wide; raceme elongate, often 0.4 m. long or more; pedicels decurrent, 2–3 mm. long, slightly longer in fruit; perianth-segments 6, each subtending a large sessile anther; pistil of 6 united carpels; fruit oblong or ovoid, 5–6 mm. long, 2–4 mm. thick, obtuse at the base, with 6 recurved tips at the summit; carpels 3-angled, flat or slightly grooved on the back, or the dorsal edges curving upward and winged, separating at maturity from the hexagonal axis.

TYPE LOCALITY: Europe.
DISTRIBUTION: Labrador to Alaska, south to New Jersey, western New York, Ohio, Wisconsin, Nebraska, New Mexico, California, northern Mexico, and Lower California; also in Europe and Asia.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 186;* Mem. Torrey Club **3**: *pl. 22;* Fl. Dan. **2**: *pl. 306;* Gaertn. Fruct. *pl. 84;* Benth. Ill. Handb. Brit. Fl. **2**: *f. 964;* Sv. Bot. **2**: *pl. 112;* Coste, Fl. Fr. *f. 3698;* Pratt, Fl. Pl. Great Brit. **3**: *pl. 233, f. 7;* Bild. Nord. Fl. *pl. 486, B;* Sturm, Deuts. Fl. 78: *pl. 5.*

2. **SCHEUCHZERIA** L. Sp. Pl. 338. 1753.

Rush-like bog perennials with creeping rootstocks, and erect leafy stems, the leaves elongate, half-rounded below and flat above, striate, furnished with a pore at the apex and a membranous ligulate sheath at the base. Flowers small, racemose, bracted. Perianth 6-parted, regularly 2-serial, persistent. Stamens 6, inserted at the base of the perianth-segments; filaments elongate; anthers linear, basifixed, extrorse. Ovaries 3 or rarely 4–6, distinct or connate at the base, 1-celled, each cell with 1 to 3 collateral ovules. Stigmas sessile, papillose or slightly fimbriate. Carpels divergent, inflated, coriaceous, 1- or 2-seeded, follicle-like, laterally dehiscent. Seeds straight or slightly curved, without endosperm.

Type species, *Scheuchzeria palustris* L.

1. **Scheuchzeria palustris** L. Sp. Pl. 338. 1753.

Leaves 10–40 cm. long, the upper ones reduced to bracts; stems solitary or several, usually clothed at the base with the remains of old leaves, 10–40 cm. tall; sheaths of the basal leaves often 10 cm. long with a ligule 12 mm. long; pedicels spreading in fruit; flowers white, few, in a lax raceme; perianth-segments oblong, membranous, 1-nerved, 3 mm. long, the inner ones the narrower; lower fruiting pedicels 5–25 mm. long; follicles 4–8 mm. long, slightly if at all united at the base; seeds oval, brown, with a very hard coat.

TYPE LOCALITY: Lapland.
DISTRIBUTION: Labrador to Alaska, New Jersey, Pennsylvania, Wisconsin, Montana, and California; also in northern Europe and Asia.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 187;* Mem. Torrey Club **3**: *pl. 23;* Benth. Ill. Handb. Brit. Fl. **2**: *f. 962;* Fl. Dan. **1**: *pl. 76;* Coste, Fl. Fr. *f. 3697;* Pratt, Fl. Pl. Great Brit. **3**: *pl. 233, f. 8;* Baxter, Brit. Bot. **6**: *pl. 503;* L. Fl. Lapp. *pl. 10, f. 1;* Schkuhr, Handb. *pl. 100;* Sturm, Deuts. Fl. 78: *pl. 4.*

Family 2. **ALISMACEAE**

By John Kunkel Small

Annual or perennial acaulescent aquatic or marsh herbs. Leaves basal; petioles elongate, sheathing at the base, the blades flat, several-ribbed, often with spreading or deflexed lobes. Scapes erect or floating, with simple or branched inflorescence. Flowers perfect or unisexual, regular, whorled, borne in terminal racemes or panicles. Receptacle flat, conic, convex or globose. Calyx of 3 persistent green sepals. Corolla white or pink, of 3 deciduous imbricate petals. Androecium of 6 or more stamens. Filaments distinct. Anthers 2-celled, extrorse. Gynoecium of few or many verticillate or capitate carpels. Ovaries 1-celled. Styles rather persistent. Ovules solitary or several in each cavity. Fruit a head of flat or turgid achenes. Seeds curved. Embryo horseshoe-shaped.

Carpels borne in one series; achenes verticillate.
- Style lateral; achenes minutely beaked; anthers short; petals entire. 1. Alisma.
- Style apical; achenes long-beaked; anthers elongate; petals incised. 2. Machaerocarpus.

Carpels borne in several series; achenes capitate.
- Flowers perfect.
  - Style not apical; fruit-heads not echinate; achenes very turgid, beakless or obscurely beaked. 3. Helianthium.
  - Style apical; fruit-heads echinate; achenes mostly flat, prominently beaked. 4. Echinodorus.
- Flowers polygamous, monoecious or dioecious, the lower flowers of the inflorescence perfect or pistillate, the upper ones staminate.
  - Lower flowers of the inflorescence perfect. 5. Lophotocarpus.
  - Lower flowers of the inflorescence pistillate. 6. Sagittaria.

1. **ALISMA** L. Sp. Pl. 342. 1753.

Annual, or mostly perennial scapose herbs. Leaves erect or floating; blades several-veined, without basal lobes, but sometimes cordate, gradually or abruptly narrowed into petioles. Flowers perfect, in compound often diffuse panicles. Sepals 3, broad, usually ribbed, persistent. Petals 3, white or pinkish, spreading, entire, deciduous. Stamens 6, two opposite each petal; filaments slender; anthers short. Carpels few or many, in one whorl, attached to the depressed receptacle by their minute bases. Achenes in 1 depressed, discoid whorl, ribbed or grooved on the back.

Type species, *Alisma Plantago-aquatica* L.

Achenes longer than wide, grooved on the back, the inner edges not meeting in the whorl; peduncles and pedicels straight, ascending.
- Petals slightly longer than the sepals; corolla 3–4.5 mm. wide; achenes 1.5–2 mm. long. 1. *A. subcordatum.*
- Petals much longer than the sepals; corolla 10–13 mm. wide; achenes 2.5–3 mm. long. 2. *A. brevipes.*

Achenes as wide as long, ridged on the back, the inner edges meeting in the whorl; peduncles and pedicels recurved. 3. *A. Geyeri.*

1. **Alisma subcordatum** Raf. Med. Repos. II. 5: 362. 1808.

Alisma triviale Pursh, Fl. Am. Sept. 252. 1814.
Alisma parviflorum Pursh, Fl. Am. Sept. 253. 1814.
Alisma Plantago Bigel. Fl. Bost. 87. 1814. Not *A. Plantago* L. 1759.
Alisma Plantago parviflorum Torr. Fl. U. S. 382. 1824.
Alisma Plantago americanum R. & S. Syst. Veg. 7: 1598. 1830.
Alisma Plantago-aquatica Britt. & Brown, Ill. Fl. 1: 85. 1896. Not *A. Plantago-aquatica* L. 1753.

Plants erect, glabrous or nearly so; leaf-blades oblong, elliptic, oval or ovate, or sometimes narrower, 3–15 cm. long, usually abruptly pointed at the apex, cuneate to truncate or cordate at the base; the petioles often longer than the blades; scapes 1–10 dm. tall, solitary or several together; the branches and pedicels in whorls of 3–10, variable in

length, usually slender, sometimes filiform; bracts lanceolate or linear, often acuminate; sepals broadly ovate to suborbicular, obtuse; petals white or pinkish, 1–2 mm. long; achene-heads 3.5–4.5 mm. broad, the achenes obliquely obovate, 1.5–2 mm. long, the beak small, ascending.

TYPE LOCALITY: United States.
DISTRIBUTION: Massachusetts to Minnesota, Florida, and Texas.
ILLUSTRATION: Britt. & Brown, Ill. Fl. *f. 188.*

2. **Alisma brevipes** Greene, Pittonia 4: 158. 1900.

Alisma superbum Lunell, Bull. Leeds Herb. 2: 5. 1908.

Plants similar to those of *A. subcordatum* in habit, but commonly larger; leaf-blades oblong or oblong-lanceolate to ovate, 5–19 cm. long, acute, sometimes abruptly pointed at the apex, rounded, truncate or subcordate at the base or sometimes gradually narrowed to the petiole, which commonly exceeds the blade in length; scapes 1 m. tall or less, the branches and pedicels very numerous, except in small plants; bracts lanceolate or linear-lanceolate; sepals suborbicular or orbicular-ovate, mostly over 3 mm. long; petals white, 5–6 mm. long; achene-heads 5–6.5 mm. broad, the achenes obovate, 2.5–3 mm. long, the beak ascending.

TYPE LOCALITY: Piedra, Colorado.
DISTRIBUTION: Nova Scotia to British Columbia, North Dakota, and California.

3. **Alisma Geyeri** Torr. in Nicollet, Rep. Hydrograph. Miss. Riv. 162. 1843.

Alisma validum Greene, Pittonia 3: 156. 1896.
Alisma arcuatum Lunell, Bot. Gaz. 43: 210. 1907. Not *A. arcuatum* Michalet. 1854.
Alisma arcuatum pumilum Lunell, Bot. Gaz. 43: 211. 1907. Not *A. arcuatum pumilum* Prahl. 1890.
Alisma arcuatum lanceolatum Lunell, Bot. Gaz. 43: 211. 1907. Not *A. lanceolatum* With. 1796.
Alisma arcuatum angustissimum Lunell, Bot. Gaz. 43: 211. 1907. Not *A. Plantago angustissimum* DC. 1815.

Plants diffuse; leaf-blades oblong, elliptic, oblong-lanceolate or ovate-lanceolate, or rarely linear, 5–9 cm. long, acute or slightly acuminate at the apex, narrowed at the base; the petioles usually longer than the blades; scapes mostly 1–5 dm. long, more or less diffusely spreading, the branches and pedicels relatively stout; bracts lanceolate; sepals orbicular-ovate, about 2.5 mm. long; petals pink, 2–4 mm. long; achene-heads 4.5–5.5 mm. broad, the achenes suborbicular, about 2 mm. in diameter, the beak erect or nearly so.

TYPE LOCALITY: Near Devils Lake, North Dakota.
DISTRIBUTION: Western New York to North Dakota, Oregon, and Nevada.

2. **MACHAEROCARPUS** Small, gen. nov.

Perennial scapose herbs. Leaves erect, ascending or floating; blades dilated, 3–5-veined, not lobed at the base, long-petioled. Flowers perfect, borne in simple panicles. Sepals 3, broad, ribbed, persistent. Petals 3, white or pink, spreading, incised, deciduous. Stamens 6, two opposite each sepal; filaments flattened; anthers elongate. Carpels few, in one whorl, attached to the conic receptacle by their broad bases. Achenes in one radiant whorl, ribbed on the back, the faces depressed, the beak erect, as long as the achene-body or longer.

Type species, *Damasonium californicum* Torr.

1. **Machaerocarpus californicus** (Torr.) Small.

Damasonium californicum Torr.; Benth. Pl. Hartw. 341. 1857.
Alisma californicum Micheli, in DC. Monogr. Phan. 3: 34. 1881.

Leaf-blades oblong to ovate or linear-oblong, 2.5–6 cm. long, obtuse at the apex, obtuse, rounded, truncate, or subcordate at the base, the petioles, at least some of them, much longer than the blades; scapes usually several together, erect or decumbent, 1–4 dm. long, the pedicels loosely spreading or recurving at least in fruit; sepals broadly oblong or ovate-

oblong, 4–5 mm. long; petals suborbicular, 8–10 mm. long; achenes dagger-like, 6–10, horizontally radiant, 7–12 mm. long, the beak subulate.

TYPE LOCALITY: Sacramento, California.
DISTRIBUTION: Northern California.
ILLUSTRATIONS: Pacif. R. R. Rep. 4: *pl. 21;* Engler, Pflanzenreich 4^{15}: *f. 9.*

3. **HELIANTHIUM** Engelm.; Britton, Man. ed. 2. 54. 1905.

Annual or perennial, scapose, marsh or aquatic herbs. Leaves erect or ascending, or floating; blades narrow and gradually narrowed into the petiole or broad and deeply cordate at the base, 3–several-ribbed. Scapes as long as the leaves or longer, terminating in a few-flowered whorl or a many-flowered panicle, the pedicels spreading or recurving in fruit. Flowers perfect. Sepals 3, broad, embracing the fruit-head or reflexed beneath it. Petals 3, mainly white or pink, about as long as the sepals. Stamens 6 or 9; filaments elongate; anthers very short, often broader than long. Carpels relatively few, borne in few series on an elevated receptacle. Style not apical, minute; stigma acute. Achenes forming a globular or depressed head, turgid, crested-ribbed, obscurely beaked or beakless.

Type species, *Echinodorus parvulus* Engelm.

Leaf-blades narrow, acute at the base; inflorescence simple; sepals embracing the fruit-head; stamens 9. 1. *H. parvulum.*
Leaf-blades broad, cordate at the base; inflorescence compound; sepals reflexed under the fruit-head; stamens 6. 2. *H. nymphaeifolium.*

1. **Helianthium parvulum** (Engelm.) Small.

?*Alisma tenellum* Mart.; R. & S. Syst. Veg. 7: 1600. 1830.
Echinodorus parvulus Engelm. in A. Gray, Man. ed. 2. 438. 1856.
?*Echinodorus tenellus* Buch. Abh. Nat. Ver. Bremen 2: 18. 1868.
Helianthium tenellum Britton, Man. ed. 2. 54. 1904.

Plants 1.5 dm. tall or less; leaf-blades linear to elliptic or oblong, 1–3 cm. long, acute or acutish at the apex, 3-veined, gradually narrowed into the slender petioles which usually somewhat exceed the blade in length; scapes solitary or few together, mostly as long as the leaves or longer; pedicels mostly 2–8, recurved in fruit, 5–25 mm. long; sepals orbicular-ovate or deltoid-ovate, 1.5–2 mm. long; petals suborbicular, about as long as the sepals, emarginate at the apex; fruit-heads globular, 3–4 mm. in diameter, embraced by the persistent calyx; achenes 1–1.5 mm. long, the ribs obscurely crested.

TYPE LOCALITY: Michigan.
DISTRIBUTION: Massachusetts to western Ontario, Minnesota, Florida, and Texas; Mexico; Cuba. Perhaps also in South America.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 189* (excluding the flower and fruit); Rhodora 5: *pl. 45, f. 1–10;* A. Gray, Man. ed. 7. *f. 42.*

2. **Helianthium nymphaeifolium** (Griseb.) Small.

Alisma nymphaeifolium Griseb. Cat. Pl. Cuba 218. 1866.
Echinodorus nymphaeifolius Buch. Bot. Jahrb. 2: 483. 1882.

Plants several dm. tall; leaf-blades ovate to oblong-ovate, 5–14 cm. long, rounded at the apex, 9–13-veined, deeply cordate at the base, the petioles stout, often greatly elongate; scapes solitary or few together, the pyramidal panicle usually exceeding the leaves; pedicels numerous, becoming 9–22 mm. long; sepals ovate, usually broadly so, 1–1.5 mm. long; petals suborbicular, scarcely as long as the sepals, rounded at the apex; fruit-heads depressed, 4–5 mm. broad, subtended by the reflexed persistent calyx; achenes about 2 mm. long, the ribs prominently crested.

TYPE LOCALITY: Western Cuba.
DISTRIBUTION: Cuba.

4. **ECHINODORUS** Rich.; Engelm. in A. Gray, Man. 460. 1848.

Annual or perennial, usually acaulescent, marsh herbs. Leaves erect or ascending; blades sometimes ample, several-ribbed. Scapes usually surpassing the leaves, often greatly elongate, the flower-whorls usually remote, the pedicels very short or relatively short. Flowers perfect. Stamens 12–30, or rarely fewer; filaments often about as long as the

anthers, or longer; anthers of an oblong type. Carpels numerous, inserted on a convex or globose receptacle. Style apical; stigma simple. Achenes forming a bristly head, flat, or the body somewhat turgid, smooth-ribbed, beaked by the persistent, straight or curved style.

Type species, *Alisma rostratum* Nutt.

Fruit-bearing pedicels short, often very short, the fruit-heads approximate to the scape or appressed to it, the inflorescence thus virgate.
  Leaf-blades more or less elongate, gradually narrowed into the petiole.
    Achene turgid, with a short stout beak which is sometimes hooked at the apex. 1. *E. Grisebachii.*
    Achene flat, with a long slender incurved beak. 2. *E. Andrieuxii.*
  Leaf-blades broad, of an ovate type, cordate or subcordate at the base. 3. *E. bracteatus.*
Fruit-bearing pedicels elongate, the fruit-heads borne away from the scape, the inflorescence thus lax.
  Leaf-blades narrowed at the base or shallowly cordate; sepals ribbed, scarcely accrescent, spreading or reflexed beneath the fruit-head.
    Achenes sessile; foliage not muricate.
      Flowers, and fruit-heads, borne on stiff spreading pedicels. 4. *E. cordifolius.*
      Flowers, and fruit-heads, borne on pliable curved pedicels.
        Leaf-blades of an ovate type, truncate or shallowly cordate at the base.
          Achene-body falcate, about 2 mm. long, the beak arising from the top of the body; bracts linear-lanceolate. 5. *E. radicans.*
          Achene-body cuneate-obovate, about 1.5 mm. long, the beak arising from the inner side of the body; bracts ovate. 6. *E. virgatus.*
        Leaf-blades of an oblong or elliptic type, cuneate, often broadly so at the base. 7. *E. ovalis.*
    Achenes stipitate; foliage muricate. 8. *E. muricatus.*
  Leaf-blades deeply cordate at the base; sepals smooth, conspicuously accrescent, enveloping the fruit-head. 9. *E. tunicatus.*

1. **Echinodorus Grisebachii** Small.

Echinodorus intermedius var. Griseb. Cat. Pl. Cub. 218. 1866.

Leaf-blades oblong or elliptic, or "ovate," 3–11 cm. long, obtuse, 3–5-veined, gradually narrowed at the base, the petioles very variable in length, sometimes longer than the blades; scape often solitary, 3–4 dm. tall, the inflorescence virgate, raceme-like, the floral whorls few, remote, dense; bracts lanceolate; pedicels 2–6 mm. long, or rarely longer, recurved in fruit; sepals ovate or oval, 2.5–3 mm. long, obtuse, spreading in age; petals white, slightly longer than the sepals; fruit-heads 4–5 mm. in diameter; achenes 1.5–2 mm. long, the body turgid, obovoid, prominently ribbed, the beak less than one half as long as the body.

TYPE LOCALITY: Not given [Cuba].
DISTRIBUTION: Cuba.

2. **Echinodorus Andrieuxii** (H. & A.) Small.

Alisma Andrieuxii H. & A. Bot. Beech. Voy. 311. 1837.
Echinodorus ellipticus Micheli, in DC. Monog. Phan. 3: 51, in part. 1881. Not *Alisma ellipticum* Mart. 1830.
Echinodorus ellipticus ovatus Buch. in Engler, Pflanzenreich 4^{15}: 34. 1903.

Leaf-blades elliptic or oblong, 13–20 cm. long, obtuse, 5–9-veined, rather gradually narrowed at the base, the petioles mostly longer than the blades; scapes commonly solitary, mostly 5–12 dm. tall, the inflorescence virgate, raceme-like, the floral whorls several, dense, remote; bracts lanceolate, attenuate; pedicels 8–14 mm. long, ascending in age; sepals broadly ovate, 4.5–6 mm. long, obtuse, spreading in age; petals white, twice or thrice as long as the sepals; fruit-heads ovoid, 6–8 mm. long; achenes 2.5–3 mm. long, the body cuneate or obovate-cuneate, flattish, strongly ribbed, the beak less than one half as long as the body.

TYPE LOCALITY: Mexico.
DISTRIBUTION: Mexico.

3. **Echinodorus bracteatus** Micheli, in DC. Monog. Phan. 3: 59. 1881.

Leaf-blades ovate, often broadly so, 25–35 cm. long, 7–11-veined, acute or acutish at the apex, shallowly and widely cordate at the base, the petioles elongate; scape 2 m. tall

or less, with numerous elongate virgate branches, the inflorescence open-paniculate, the floral whorls dense, numerous, separated and sometimes remote; bracts lanceolate or triangular-lanceolate, attenuate; pedicels mostly 1–4 mm. long, recurved in age; sepals broadly ovate or orbicular-ovate, 4.5–5.5 mm. long, obtuse, spreading or reflexed in age; petals white, three to four times longer than the sepals; fruit-heads globose or depressed, 4–5 mm. in diameter, nodding; achenes about 2.5 mm. long, the body obovoid, flattish, prominently ribbed, the beak stout, much shorter than the body.

TYPE LOCALITY: Panama.
DISTRIBUTION: Panama.

4. **Echinodorus cordifolius** (L.) Griseb. Abh. K. Ges. Wiss. Gött. **7**: 257. 1857.

Alisma cordifolium L. Sp. Pl. 343. 1753.
Alisma Berterii Spreng. Syst. **2**: 163. 1825.
Alisma Berteroanum Balbis; R. & S. Syst. Veg. **7**: 1605. 1830.
Alisma rostratum Nutt. Trans. Am. Phil. Soc. II. **5**: 159. 1837.
Alisma Sprengelii Kunth, Enum. **3**: 154. 1841.
Echinodorus rostratus Engelm. in A. Gray, Man. 460. 1848.
Echinodorus rostratus lanceolatus Engelm.; A. Gray, Man. ed. 6. 556. 1890.
Echinodorus cordifolius lanceolatus Mackenzie & Bush, Fl. Jackson Co. 10. 1902.

Leaf-blades various, broadly ovate to lanceolate, 4–20 cm. long, obtuse or acute at the apex, 3–13-veined, commonly truncate or cordate at the base; petioles angled, usually longer than the blades; scapes solitary or clustered, 1–5 dm. tall or more, surpassing the leaves, simple, or branched from the lower whorls of the inflorescence; pedicels 7–15 mm. long, not very variable in length; bracts lanceolate or linear-lanceolate; sepals ovate, 4–5 mm. long, rather acute; petals white, twice as long as the sepals or less, usually broader; fruit-heads bur-like, globose to ovoid, 4–10 mm. long; achenes 2.5–3 mm. long, the body cuneate, flattish, very prominently ribbed, the beak slender, fully one half as long as the body.

TYPE LOCALITY: Virginia.
DISTRIBUTION: Illinois to Kansas, Florida, Texas, Mexico, and Central America. Also in the West Indies.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 191;* A. Gray, Man. ed. 7. *f. 43* (fruit).

5. **Echinodorus radicans** (Nutt.) Engelm. in A. Gray, Man. 460. 1848.

Sagittaria radicans Nutt. Trans. Am. Phil. Soc. II. **5**: 159. 1837.

Leaf-blades ovate or oblong, 5–20 cm. long, obtuse at the apex, truncate or cordate at the base; petioles 1–7 dm. long; scapes elongate, spreading or decumbent, creeping, 3–12 dm. long, often solitary; whorls of the inflorescence remote; pedicels 3–12 together, unequal, 1.5–6 cm. long; bracts linear-lanceolate from dilated bases; sepals ovate or orbicular-ovate, 5–6.5 mm. long, rather obtuse; petals white, somewhat longer than the sepals; fruit-heads depressed, globose or ovoid, 7–8 mm. in diameter; achenes 2 mm. long, the body falcate, 6–10-ribbed, the beak about one fourth as long as the body, incurved.

TYPE LOCALITY: Fort Smith, Arkansas.
DISTRIBUTION: Illinois to Kansas, District of Columbia, Florida, Texas, southern California, and Mexico.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 190;* A. Gray, Man. ed. 7. *f. 44* (fruit).

6. **Echinodorus virgatus** (H. & A.) Micheli, in DC. Monogr. Phan. **3**: 54. 1881.

Alisma virgatum H. & A. Bot. Beech. Voy. 311. 1837.

Leaf-blades ovate or oval-ovate, mostly 15–20 cm. long, rounded and sometimes mucronate at the apex, 9–11-veined, shallowly cordate at the base; petioles elongate; scapes erect, at least during anthesis, often branched, the inflorescence lax, the floral whorls remote and loose; pedicels mostly 1–2 cm. long, recurving; bracts ovate, acuminate, shorter than the pedicels; sepals ovate or oval, about 4 mm. long, reflexed in age; petals not seen; fruit-heads 6–7 mm. in diameter; achenes fully 1.5 mm. long, the body obliquely cuneate-

obovate, about 6-ribbed, the beak slender, about one third as long as the body, straight or slightly curved.

TYPE LOCALITY: Mexico.
DISTRIBUTION: Mexico.

7. **Echinodorus ovalis** Wright, in Sauv. Anal. Acad. Ci. Habana **7**: 564. 1871.

Leaf-blades oblong or elliptic, 7–18 cm. long, rounded at the apex, 5–7-veined, cuneate, often broadly so, at the base; petioles elongate; scapes 1 m. tall or less, the inflorescence lax, the floral whorls remote, loose; pedicels mostly 2–3 cm. long; bracts lanceolate; sepals suborbicular or orbicular-obovate, 4–5 mm. long, spreading in age; petals white, about twice as long as the sepals; fruit not seen.

TYPE LOCALITY: Western Cuba.
DISTRIBUTION: Cuba.

8. **Echinodorus muricatus** Griseb. Bonplandia **6**: 11. 1858.

Echinodorus macrophyllus muricatus Micheli, in DC. Monog. Phan. **3**: 50. 1881.

Leaf-blades orbicular-ovate or orbicular-reniform, mostly 3–4 dm. long, sometimes larger, obtuse at the apex, 13–17-veined, cordate at the base; petioles elongate, muricate, as is the leaf-blade; scapes 1 m. tall or more, widely paniculate, the floral whorls remote, lax; bracts lanceolate; pedicels 1.5–2.5 cm. long; sepals broadly ovate to suborbicular, 5–6 mm. long, spreading at maturity; petals white, twice or thrice as long as the sepals; achenes about 3 mm. long, falcate, the body narrowed to both ends, the beak flat, broad, shorter than the body.

TYPE LOCALITY: Panama.
DISTRIBUTION: Panama and northern South America.

9. **Echinodorus tunicatus** Small, sp. nov.

Leaf-blades ovate, often narrowly so, 1–4 dm. long, obtuse at the apex, 11–13-veined, deeply cordate at the base; petioles elongate, mostly much longer than the blades; scapes about 1 m. tall or less, rounded below, obtusely 3-angled above, the floral whorls remote, many-flowered; bracts with ovate bases and elongate tips; pedicels 1–2.5 cm. long, recurving in age; sepals (mature) suborbicular or reniform, 9–15 mm. long, converging over the fruit-head; fruit-heads much depressed, 11–13 mm. wide, nodding; achenes 2.5–3 mm. long, the body narrowly cuneate, prominently ribbed, the beak incurved, less than one half as long as the body.

Type collected opposite Marraganti, Panama, April, 1908, *R. S. Williams 991.*
DISTRIBUTION: Known only from the type locality.

5. **LOPHOTOCARPUS** T. Durand, Index Gen. Phan. x. 1888.

Lophiocarpus Miq. Fl. Arch. Ind. 1^2: 50. 1870. Not *Lophiocarpus* Turcz. 1843.

Annual or perennial acaulescent aquatic or marsh herbs. Scapes simple at least below the inflorescence. Flowers polygamous, borne in several whorls of 2 or 3 at the top of the scape, the upper staminate, the lower perfect. Stamens 9–15; filaments flattened, inserted at the base of the receptacle. Carpels numerous, borne on a convex receptacle. Style slender, oblique. Achenes crowded together, crested or winged, more or less enveloped by the calyx. Embryo horseshoe-shaped.

Type species, *Sagittaria calycina* Engelm.

Leaf-blades narrowed at the base or hastate, with more or less divergent acuminate basal lobes.
  Scapes about as long as the leaves; achene with the dorsal wing thick.
    Fruit-bearing pedicels long (3–5 cm.) and slender; fruit-heads less than 1 cm. thick. 1. *L. fluitans.*
    Fruit-bearing pedicels short (1–2 cm.) and thick; fruit-heads over 1 cm. thick. 2. *L. californicus.*
  Scapes shorter than the leaves; achene with the dorsal wing thin.
    Leaf-blades hastate or sagittate; plants of fresh-water ponds or marshes.
      Leaf-blades with small basal lobes shorter than the terminal lobe. 3. *L. depauperatus.*
      Leaf-blades with large basal lobes fully as long as the terminal one. 4. *L. calycinus.*

Leaf-blades imperfect or obsolete, the phyllodia thick or partially flattened; plants of salt or brackish water.
- Phyllodia terete or nearly so, prominently nodose-septate. 5. *L. spongiosus.*
- Phyllodia flat, more or less spatulate, not prominently nodose. 6. *L. spathulatus.*

Leaf-blades ovate to suborbicular with rounded or abruptly pointed broad basal lobes. 7. *L. guayanensis.*

1. **Lophotocarpus fluitans** (Engelm.) J. G. Smith, Rep. Mo. Bot. Gard. **11**: 145. 1899.

Sagittaria calycina fluitans Engelm. Bot. Mex. Bound. Surv. 212. 1859.

Plants submerged; leaves usually erect, mostly 1.5–5 dm. tall, the petioles slender, the blades linear, lanceolate, or sagittate, mostly 3–5 cm. long, or longer, including the basal lobes, which are shorter than the terminal lobe; scapes about as long as the leaves, with 2 or 3 remote whorls; fruit-bearing pedicels elongate, mostly 3–5 cm. long, shorter than the rachis-internodes; fruit-heads about 8 mm. in diameter; achenes obovate, 2 mm. long, the beak minute, the dorsal wing thick and prominent.

TYPE LOCALITY: Western Texas.
DISTRIBUTION: Western Texas, New Mexico, and southern California.
ILLUSTRATION: Rep. Mo. Bot. Gard. **11**: *pl. 53.*

2. **Lophotocarpus californicus** J. G. Smith, Rep. Mo. Bot. Gard. **11**: 146. 1899.

Plants submerged; leaves usually ascending, mostly 3–4 dm. tall, the petioles slender, the blades hastate or sagittate, 4–8 cm. long, or longer, including the divergent basal lobes, which are as long as the terminal lobe or shorter; scapes about as long as the leaves, with 3–5 rather approximate whorls; sepals broadly ovate or suborbicular, becoming 6–9 mm. long; fruit-bearing pedicels short and thick, 1–2 cm. long, as long as the rachis-internodes or nearly so; fruit-heads 10–12 mm. in diameter; achenes cuneate or obovate-cuneate, nearly 2.5 mm. long, the beak minute, the dorsal wing broad and thick.

TYPE LOCALITY: Coyote Creek, Los Angeles County, California.
DISTRIBUTION: California.
ILLUSTRATION: Rep. Mo. Bot. Gard. 11: *pl. 54.*

3. **Lophotocarpus depauperatus** J. G. Smith, Rep. Mo. Bot. Gard. **11**: 148. 1899.

Plants mostly emersed; leaves 1.5–3 dm. tall, the petioles relatively slender, the blades oblong, elliptic, sagittate or hastate, 2–4 cm. long, including the basal lobes which are usually more or less spreading; scapes about one half as long as the leaves, mostly with 1 or 2 whorls; sepals suborbicular, becoming 6–7 mm. long; fruit-bearing pedicels rather stout, 1–3 cm. long; fruit-heads 7–8 mm. in diameter; achenes cuneate, fully 2 mm. long, or rarely shorter, the beak slender, the dorsal wing thin.

TYPE LOCALITY: Missouri.
DISTRIBUTION: Wisconsin to Illinois, Missouri, and Oklahoma.
ILLUSTRATION: Rep. Mo. Bot. Gard. 11: *pl. 55.*

4. **Lophotocarpus calycinus** (Engelm.) J. G. Smith, Mem. Torrey Club **5**: 25. 1894.

Sagittaria calycina Engelm. Bot. Mex. Bound. Surv. 212. 1859.
Sagittaria calycina maxima Engelm. Bot. Mex. Bound. Surv. 212. 1859.
Sagittaria calycina media Engelm. Bot. Mex. Bound. Surv. 212. 1859.
Sagittaria calycina grandis Engelm. in A. Gray, Man. ed. 5. 494. 1867.
Lophiocarpus calycinus Micheli, in DC. Monog. Phan. **3**: 61. 1881.
Lophotocarpus calycinus maximus B. L. Robinson, in A. Gray, Man. ed. 7. 84. 1908.

Plants mostly emersed; leaves 1.5–6 dm. tall, the petioles stout, the blades sagittate, hastate or lunate, 6–30 cm. long, the basal lobes usually longer than the broad terminal lobe, usually caudate-acuminate; scapes shorter than the leaves, the inflorescence usually simple, with 2–7 whorls; sepals suborbicular to orbicular-reniform, becoming 9–15 mm. long; fruit-bearing pedicels very thick, usually elongate, mostly 3–5 cm. long; fruit-heads

11–16 mm. in diameter; achenes broadly cuneate, 2–2.5 mm. long, the beak stout, the dorsal wing thin.

TYPE LOCALITY: Louisiana.
DISTRIBUTION: South Dakota to Delaware, Alabama, and New Mexico.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 192;* Engler, Pflanzenreich 4^{15}: *f. 13, A, B* (fruit).

5. **Lophotocarpus spongiosus** (Engelm.) J. G. Smith, Rep. Mo. Bot. Gard. **11**: 148. 1899.

Sagittaria calycina spongiosa Engelm. in A. Gray, Man. ed. 5. 493. 1867.

Plants submerged; leaves 1–2 dm. tall, the petioles stout and spongy, conspicuously nodose-septate, the blades spatulate, oblong, elliptic, sagittate or hastate, 1–3 cm. long, the basal lobes, when present, more or less falcate; scapes about one half as long as the leaves or less, the inflorescence simple, with one or two whorls; sepals broadly ovate or orbicular-ovate, becoming 10–12 mm. long; fruit-bearing pedicels very stout, 1–2 cm. long, or rarely longer; fruit-heads 7–10 mm. in diameter; achenes cuneate, 2–2.5 mm. long, the beak short, at the top of the achene-body, the dorsal wing thin.

TYPE LOCALITY: Northeastern Atlantic States.
DISTRIBUTION: New Brunswick to Virginia.
ILLUSTRATION: Rep. Mo. Bot. Gard. 11: *pl. 56.*

6. **Lophotocarpus spathulatus** J. G. Smith, Rep. Mo. Bot. Gard. **11**: 149. 1899.

Plants aquatic; leaves less than 1 dm. tall, the petioles stout, not conspicuously septate, the blades linear or spatulate dilations at the top of the petioles, or wanting; scapes shorter than the leaves, stout but weak, the inflorescence with but one whorl; sepals ovate to orbicular-ovate, becoming 3 mm. long; fruit-bearing pedicels stout, about 1 cm. long or less; fruit-heads 5–6 mm. in diameter; achenes cuneate, 1.5–2 mm. long, the beak much below the top of the achene-body, the narrow dorsal wing thin.

TYPE LOCALITY: Newburyport, Massachusetts.
DISTRIBUTION: Massachusetts.
ILLUSTRATION: Rep. Mo. Bot. Gard. 11: *pl. 57.*

7. **Lophotocarpus guayanensis** (H.B.K.) J. G. Smith, Rep. Mo. Bot. Gard. **6**: 61. 1894.

Sagittaria guayanensis H.B.K. Nov. Gen. & Sp. 1: 250. 1816.
Echinodorus guyanensis Griseb. Fl. Brit. W. Ind. 505. 1864.
Lophiocarpus guyanensis Micheli, in DC. Monog. Phan. 3: 62. 1881.
Lophotocarpus guyanensis typicus Buch. in Engler, Pflanzenreich 4^{15}: 36. 1903.

Plants submerged; leaves very variable in length, the petioles slender or stout, nodose-septate, the blades ovate to suborbicular, 4–7 cm. long, obtuse or emarginate at the apex, the ovate basal lobes obtuse or abruptly pointed; scapes often shorter than the leaves, with few rather approximate whorls; sepals ovate, becoming 8–11 mm. long; fruit-bearing pedicels short and stout, often exceeded by the bracts; fruit-heads 12–15 mm. in diameter; achenes obovate, 2–2.5 mm. long, short-beaked, the margin tuberculate-crested all around, the faces tuberculate.

TYPE LOCALITY: Venezuela.
DISTRIBUTION: Mexico and Central America; Trinidad; also in northern South America.
ILLUSTRATIONS: Mart. Fl. Bras. 3^{1}: *pl. 15;* Engler, Pflanzenreich 4^{15}: *f. 12, A.*

6. **SAGITTARIA** L. Sp. Pl. 993. 1753.

Perennial, acaulescent, marsh or aquatic herbs, either more or less emersed and erect, or submerged and floating. Rootstock irregularly thickened or tuber-bearing. Leaves various, usually differentiated into petioles and blades, or represented by phyllodia. Scapes sometimes greatly elongate, usually simple, at least below the inflorescence. Flowers monoecious or dioecious, in whorls of 3 near the top of the scape, those of the lower whorls usually pistillate, those of the upper whorls usually staminate. Staminate flowers with several or many stamens; anthers 2-celled, opening by lateral slits. Pistillate flowers

with many distinct carpels. Receptacle more or less convex, spheroidal, or globose. Achenes numerous, flattened, densely crowded in globular heads, beaked.

Type species, *Sagittaria sagittifolia* L.

Sepals of the pistillate flowers ultimately lax or reflexed, not accrescent.
Fruit-bearing pedicels reflexed or recurved.
Stamens less than 10.
Filaments glabrous.
Scapes simple; phyllodia obtuse or abruptly pointed.
Filaments about as long as the anthers; achenes with 3 undulate or slightly toothed crests. 1. *S. subulata.*
Filaments much longer than the anthers; achenes with 5–7 tuberculate or prominently toothed crests. 2. *S. lorata.*
Scapes branched; phyllodia slenderly attenuate. 3. *S. filiformis.*
Filaments pubescent. 4. *S. platyphylla.*
Stamens more than 10.
Anthers subglobose; filaments longer than the anthers, much dilated. 5. *S. demersa.*
Anthers oblong, filaments shorter than the anthers, slightly enlarged. 6. *S. Sanfordii.*
Fruit-bearing pedicels ascending.
Leaf-blades without basal lobes.
Pedicels of the pistillate flowers as long as those of the staminate ones, or nearly so.
Filaments dilated, relatively short.
Leaf-blades terete or 3-sided, often imperfectly developed.
Achenes with thin crested facial wings. 7. *S. cristata.*
Achenes with thick merely uneven facial wings or ridges.
Anthers longer than the filaments; achenes with several facial wings. 8. *S. teres.*
Anthers shorter than the filaments; achenes with 3 low facial ridges. 9. *S. isoetiformis.*
Leaf-blades flat.
Filaments suborbicular; anthers much longer than the filaments. 10. *S. Eatoni.*
Filaments lanceolate, oblong, or ovate; anthers about as long as the filaments.
Achenes oval or broadly oblong. 11. *S. cycloptera.*
Achenes cuneate.
Beak large, horizontal at the top of the achene-body. 12. *S. Mohrii.*
Beak minute, borne much below the top of the achene-body.
Inflorescence simple; lower bracts ovate, united to the middle; achenes with lateral ribs or wings. 13. *S. graminea.*
Inflorescence widely branched; lower bracts lanceolate, united at the base; achenes without lateral ribs or wings. 14. *S. Chapmanii.*
Filaments not dilated, slender.
Filaments glabrous.
Achene cuneate, the beak on the side above the middle of the body; bracts broad, well united. 15. *S. papillosa.*
Achene curved-oblong, the beak horizontal at the top of the body; bracts narrow, distinct or nearly so. 16. *S. ambigua.*
Filaments pubescent.
Bracts and sepals granular-papillose. 17. *S. falcata.*
Bracts and sepals ribbed.
Achenes more or less falcate, gradually beaked, the dorsal wing thick and even. 18. *S. lancifolia.*
Achenes not falcate, abruptly beaked, the dorsal wing usually thin and crested. 19. *S. angustifolia.*
Pedicels of the pistillate flowers very short or nearly wanting.
Fruit-heads not echinate; achenes broadly winged and short-beaked; anthers broadly oblong, about as long as the filaments. 20. *S. macrocarpa.*
Fruit-heads echinate; achenes narrowly winged and long-beaked; anthers suborbicular, shorter than the filaments. 21. *S. rigida.*
Leaf-blades with basal lobes.
Achenes with flat, ridged, or winged faces.
Achenes minutely or inconspicuously beaked.
Beak horizontal.
Beak borne below the top of the achene-body. 13. *S. graminea.*
Beak borne at the top of the achene-body.
Stamens 25 or fewer; achenes narrowly winged, without facial wings. 22. *S. longiloba.*
Stamens 30 or more; achenes broadly winged, with facial wings. 23. *S. Greggii.*

Beak erect.
Basal lobes of the leaf-blades acute or acuminate.
Achenes with thin very unequal wings, the sharp beak over the outer edge of the ventral wing. 24. *S. brevirostra.*
Achenes with thick nearly equal wings, the blunt beak over the inner edge of the ventral wing. 25. *S. cuneata.*
Basal lobes of the leaf-blades rounded or obtuse. 26. *S. hebetiloba.*
Achenes prominently long-beaked.
Beak horizontal.
Inflorescence-rachis, pedicels, bracts, and sepals pubescent. 27. *S. pubescens.*
Inflorescence-rachis, pedicels, bracts, and sepals glabrous.
Bracts distinct; pedicels of the pistillate flowers short or long, but much shorter than the adjacent internodes. 28. *S. latifolia.*
Bracts united; pedicels of the pistillate flowers greatly elongate, as long as the internodes or nearly so. 29. *S. mexicana.*
Beak erect.
Filaments pubescent.
Pistillate pedicels very short; sepals and bracts glabrous. 21. *S. rigida.*
Pistillate pedicels elongate; sepals and bracts pubescent. 30. *S. viscosa.*
Filaments glabrous.
Achenes with the beak less than one half the length of the body. 24. *S. brevirostra.*
Achenes with the beak over one half the length of the body.
Basal lobes of the leaf-blades acute or acuminate.
Achenes cuneate, usually with 2 prominent facial wings. 31. *S. Engelmanniana.*
Achenes obovate or orbicular-obovate, usually with 1 facial wing. 32. *S. longirostra.*
Basal lobes of the leaf-blades rounded. 33. *S. australis.*
Achenes with tuberculate faces. 34. *S. intermedia.*
Sepals of the pistillate flowers accrescent and ultimately appressed to the fruit-heads. 35. *S. montevidensis.*

1. **Sagittaria subulata** (L.) Buch. Abh. Nat. Ver. Bremen **2**: 490. 1871.

Alisma subulatum L. Sp. Pl. 343. 1753.
Sagittaria pusilla Nutt. Gen. **2**: 213. 1818.
Echinodorus subulatus Engelm. in A. Gray, Man. 460. 1848.
Sagittaria natans lorata A. Gray, Man. ed. 5. 494. 1867.

Plants 2–16 cm. tall, usually emersed; leaves usually represented by rigid phyllodia 2–12 cm. long; the blades when present linear to linear-lanceolate, 2–3 cm. long, acutish, shorter than the petioles; scapes shorter than the leaves or sometimes longer, the whorls of the raceme solitary or often 2 or rarely 3; bracts thin, 1–5 mm. long; pedicels of pistillate heads 10–20 mm. long; sepals ovate-lanceolate, obtuse, becoming 2–3 mm. long; corollas about 15 cm. broad; fruit-heads 6–7 mm. in diameter; achenes few, 1.5 to nearly 2 mm. long, with 3 prominent but merely undulate or sparingly toothed crests, the beak lateral, ascending.

TYPE LOCALITY: Virginia.
DISTRIBUTION: Connecticut and New York to Florida and Alabama.
ILLUSTRATIONS: Rep. Mo. Bot. Gard. 6: *pl. 13, f. 1–4;* Britt.& Brown, Ill. Fl. *f. 206.*

2. **Sagittaria lorata** (Chapm.) Small.

Sagittaria natans Michx. Fl. Bor. Am. **2**: 190. 1803. Not *S. natans* Pall. 1776.
Sagittaria natans lorata Chapm. Fl. S. U. S. 449. 1860.
?*Sagittaria natans* (?) *gracillima* S. Wats. in A. Gray, Man. ed. 6. 556. 1890.
?*Sagittaria subulata gracillima* J. G. Smith, Mem. Torrey Club **5**: 26. 1894.

Plants mostly submerged, sometimes greatly elongate; leaves with bladeless petioles or blades when present floating, elliptic, oblong or ovate-oblong, 1.5–5 cm. long, rounded, subcordate, or hastate-truncate at the base; phyllodia flattened, strap-like; scape elongating to the surface of the water or rising above it, 1–10 dm. long or more; whorls of the inflorescence one or several; bracts thin, acuminate; sepals becoming 3–4.5 mm. long; corolla

fully 2 cm. wide; fruit-heads 8–10 mm. in diameter; achenes rather numerous, 2–2.5 mm. long, with 5–7 prominently dentate or crenate crests, the beak erect or decidedly curved upward.

TYPE LOCALITY: Carolina.
DISTRIBUTION: New Jersey and South Carolina to Florida; also in Massachusetts, Rhode Island, Connecticut, and New Jersey, as far as the form described as *S. natans gracillima* is concerned.
ILLUSTRATIONS: Rep. Mo. Bot. Gard. 6: *pl. 14; pl. 13, f. 5–8* (*S. natans gracillima*).

3. **Sagittaria filiformis** J. G. Smith, Rep. Mo. Bot. Gard. **6**: 46. 1895.

Plants submerged, not greatly elongate; leaves mere bladeless phyllodia with slender or filiform tips from thicker bases, 1–6 dm. long or rarely as long as the scape; scapes slender, 6–12 dm. long, often branching from the lower whorls; bracts lanceolate, 3–5 mm. long, acuminate; pedicels slender or filiform, those of the lower whorls 1–4 cm. long; whorls remote, the flowers staminate except 1 or 2 flowers of the lower whorl; sepals ovate, 2–3 mm. long, obtuse; corolla white, about 2 cm. broad; fruit-heads 6–7 mm. in diameter; achenes 1.5 mm. long, with about 6 crests, the beak lateral, upwardly curved.

TYPE LOCALITY: Dog River, Mobile County, Alabama.
DISTRIBUTION: Florida and Alabama; apparently also in the Carolinas.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 15, f. 5–8.*

4. **Sagittaria platyphylla** (Engelm.) J. G. Smith, Rep. Mo. Bot. Gard. **6**: 55. 1895.

Sagittaria graminea platyphylla Engelm. in A. Gray, Man. ed. 5. 494. 1867.

Plants emersed, erect; leaves mostly with blades, but these sometimes accompanied by narrow phyllodia, the blades thick and rather leathery, lanceolate, elliptic, or ovate, 5–15 cm. long, 5–7-nerved, acute or acuminate, gradually narrowed at the base or subcordate; scapes 2–5 dm. tall, usually overtopped by the leaves; whorls of the inflorescence 3–8, the 2 or 4 lower ones pistillate; pedicels 1–2.5 cm. long; bracts broadly ovate, 3–8 mm. long, scarious-tipped; sepals ovate or orbicular-ovate, becoming 4.5–6 mm. long; corolla 2.5–3 cm. wide; filaments pubescent; anthers oblong; fruit-heads fully 1 cm. in diameter; achenes obliquely obovate, 2 mm. long, winged on both margins, the beak horizontal, rather long.

TYPE LOCALITY: Not given.
DISTRIBUTION: Missouri and Kansas to Alabama and Texas.
ILLUSTRATIONS: Rep. Mo. Bot. Gard. 6: *pl. 26;* Britt. & Brown, Ill. Fl. *f. 206.*

5. **Sagittaria demersa** J. G. Smith, Rep. Mo. Bot. Gard. **6**: 58. 1895.

Plants submerged, but not greatly elongate; leaves mere narrow phyllodia attenuate to the blunt apex from base 10–15 mm. in diameter; scapes usually 2–3 dm. long, simple, shorter than the leaves; whorls of the inflorescence 4–6, the lower one with pistillate flowers; pedicels 1–3.5 cm. long; bracts 3–5 mm. long, partially united; sepals oblong to ovate, becoming 4–4.5 mm. long; corolla about 1.5 cm. wide; filaments glabrous; anthers suborbicular; fruit-head 5–6 mm. in diameter; achenes obovate, 1.5–2 mm. long, both margins winged, the beak lateral, erect, slender.

TYPE LOCALITY: Near Guerrero, Chihuahua, Mexico.
DISTRIBUTION: Chihuahua.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 15, f. 1–4.*

6. **Sagittaria Sanfordii** Greene, Pittonia **2**: 158. 1890.

Plants emersed or partially submerged, erect or ascending; leaves 9–15 dm. tall, sometimes partially represented by 3-sided phyllodia, the petioles spongy, very stout, commonly 2–4 cm. thick at the base, the blades linear-lanceolate to oblong-lanceolate, mostly 10–15 cm. long, acute, narrowed at the base; scapes shorter than the leaves, simple; whorls of the inflorescence several or numerous, the 2 or 3 lower ones with pistillate flowers; pedicels

1.5–2 cm. long; bracts broad, 5–7 mm. long, united at the base; sepals ovate, 4–6 mm. long; corolla about 2 cm. wide; filaments glabrous; anthers oblong; fruit-head 12–14 mm. in diameter; achenes broadly cuneate, about 2 mm. long, winged on both margins, the beak lateral, ascending, broadly triangular.

TYPE LOCALITY: About Stockton, California.
DISTRIBUTION: Lower San Joaquin River, California.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 28.*

7. **Sagittaria cristata** Engelm.; Arthur, Proc. Davenport Acad. Sci. 4: 29. 1884.

Plants wholly or partially submerged, 3–7.5 dm. tall; leaves various, the earlier ones stout, the linear-lanceolate phyllodia 8–15 cm. long, the later leaves several times longer than the phyllodia; blades linear-lanceolate to elliptic-lanceolate, 6–11 cm. long, 3-sided, much shorter than the petioles; scape elongate, commonly about as long as the leaves, simple; whorls of the inflorescence 4–6, the lowest one with pistillate flowers; pedicels 1–3 cm. long; bracts 4–7 mm. long, distinct or nearly so; sepals ovate, becoming 5–7 mm. long; corolla about 2 cm. wide; filaments pubescent; anthers ovoid; fruit-head 15–20 mm. in diameter; achenes cuneate-obovate, about 3 mm. long, with the dorsal margin undulate and the ventral margin straight, the two facial wings crested, the beak near the top of the achene-body, horizontal.

TYPE LOCALITY: Emmett County, Iowa.
DISTRIBUTION: Minnesota and Iowa, and western New York (?).
ILLUSTRATIONS: Rep. Mo. Bot. Gard. 6: *pl. 22;* Britt. & Brown, Ill. Fl. *f. 203.*

8. **Sagittaria teres** S. Wats. in A. Gray, Man. ed. 6. 555. 1890.

Plants more or less submerged, 1.5–6.5 dm. tall; leaves usually represented by elongate, attenuate, nodose phyllodia, 10–60 cm. long, occasionally developing narrow imperfect blades; scapes slender, 1–6 dm. tall, longer than the leaves; bracts ovate, 3 mm. long, obtuse; whorls of the inflorescence solitary or sometimes 3, 1 or 2 pedicels of the lower whorl bearing pistillate flowers, 10–25 mm. long, longer than those of staminate flowers; sepals ovate or oval, becoming 3 mm. long; corolla 12–15 mm. broad; filaments dilated, pubescent, shorter than the anthers; anthers oblong; fruit-heads 8–12 mm. in diameter; achenes oval or oval-obovate, 2 mm. long, with the dorsal margin undulate and the ventral one nearly straight, the several facial wings undulate, the beak stout, near the top of the achene-body, curved upward.

TYPE LOCALITY: Massachusetts.
DISTRIBUTION: Massachusetts to South Carolina.
ILLUSTRATIONS: Rep. Mo. Bot. Gard. 6: *pl. 24;* Britt. & Brown, Ill. Fl. *f. 202;* Engler, Pflanzenreich 4^{15}: *f. 17.*

9. **Sagittaria isoetiformis** J. G. Smith, Rep. Mo. Bot. Gard. 6: 115. 1895.

Plants more or less submerged, 1–3 dm. tall; leaves represented by terete, long and slenderly attenuate phyllodia, which occasionally develop thick, imperfect blades; scapes 1–3 dm. tall, or rarely less, as long as the leaves or overtopping them; whorls of the inflorescence one to three; bracts ovate, 2–3 mm. long, acute, united below; pedicels of the pistillate flowers slender, 15–18 mm. long, those of the staminate flowers filiform, often longer than the former; sepals becoming 3–4 mm. long; corolla 12–15 mm. broad; filaments ovate, pubescent, about as long as the anthers; anthers suborbicular; fruit-heads about 6 mm. in diameter; achenes obovate, 1.5 mm. long, with the dorsal and ventral margins ridged and several broad facial ridges, the short beak erect or oblique, near the top of the achene-body.

TYPE LOCALITY: Eustis, Lake County, Florida.
DISTRIBUTION: Georgia and Florida.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 53.*

10. **Sagittaria Eatoni** J. G. Smith, Rep. Mo. Bot. Gard. **11**: 150. 1899.

Plants usually submerged, 1–2 dm. tall; leaves represented by flat phyllodia, which are attenuate from broad bases, and often also by longer blade-tipped petioles, the blades linear or narrowly linear-lanceolate, 2–3.5 cm. long, acute or acuminate; scapes very slender, less than 1.5 dm. tall; whorls of the inflorescence usually one or two or rarely three; bracts ovate, about 2 mm. long, united at the base; pedicels of the pistillate flowers filiform, mostly less than 1 cm. long, those of the staminate flowers larger than the former; sepals ovate to ovate-lanceolate, becoming 3–4 mm. long; corolla 7–9 mm. broad; filaments suborbicular, pubescent, much shorter than the anthers; anthers suborbicular, conspicuously larger than the filaments; fruits not seen.

TYPE LOCALITY: Newburyport, Massachusetts.
DISTRIBUTION: Massachusetts, Connecticut, and Long Island, New York.
ILLUSTRATION: Rep. Mo. Bot. Gard. 11: *pl. 58*.

11. **Sagittaria cycloptera** (J. G. Smith) C. Mohr, Bull. Torrey Club **24**: 20. 1897.

Sagittaria graminea cycloptera J. G. Smith, Rep. Mo. Bot. Gard. 6: 52. 1894.

Plants mostly emersed, 2–8 dm. tall; leaves sometimes partially reduced to slender tapering phyllodia, the blades linear or linear-lanceolate, 4–15 cm. long, tapering to both ends, shorter than the petioles; scapes erect, usually slightly longer than the leaves, sometimes branched; whorls of the inflorescence three to fifteen, or rarely solitary, several of the lower ones usually pistillate; bracts ovate, 3–5 mm. long, acute, united at the base; sepals ovate, becoming 4–6 mm. long; corolla 15–20 mm. broad; filaments dilated, pubescent; anthers oblong, longer than the filaments; fruit-heads barely 1 cm. in diameter; achenes broadly oblong or oval, 1.5 mm. long, broadly winged, with 2 facial wings on each side, the short beak ascending, rather lateral.

TYPE LOCALITY: South Carolina.
DISTRIBUTION: South Carolina to Florida and Louisiana.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 20*.

12. **Sagittaria Mohrii** J. G. Smith; C. Mohr, Bull. Torrey Club **24**: 19. 1897.

Plants partially emersed, 3–7 dm. tall; leaves erect or ascending, the blades linear to lanceolate, 5–15 cm. long, acuminate, often poorly developed or wanting, the phyllodia then stiff and three-sided; scapes ascending, decumbent or declining, 3-angled, commonly shorter than the longer leaves; whorls of the inflorescence six to twelve, the lower three or four pistillate, with pedicels somewhat longer than those of the staminate flowers; bracts thin, 3–4 mm. long, united to about the middle; sepals oblong, becoming 5–8 mm. long, obtuse; corolla hardly 1 cm. broad or sometimes 1.5 cm. broad; fruit-heads subglobose, 6–8 mm. in diameter; achenes cuneate, 2.5–3.5 mm. long, narrowly winged, with a low facial ridge, the slender beak horizontal.

TYPE LOCALITY: Mobile, Alabama.
DISTRIBUTION: Georgia, Florida, Alabama, and Mississippi.
ILLUSTRATION: Bull. Torrey Club 24: *pl. 290*.

13. **Sagittaria graminea** Michx. Fl. Bor. Am. **2**: 190. 1803.

Plants emersed or submerged, 1–6 dm. tall; leaves represented by flat, linear, oblong, or linear-lanceolate phyllodia 5–30 cm. long and usually also by blade-tipped petioles, the blades linear, lanceolate, or elliptic, 3–15 cm. long, rarely with divergent basal lobes and hastate; scapes usually erect, simple, shorter than the leaves or overtopping them; whorls of the inflorescence few and remote or some times numerous and rather approximate; pedicels variable, but those of staminate and pistillate flowers often about equal in length; bracts ovate, 3–7 mm. long, acute, united to about the middle; sepals ovate or oblong-ovate, becoming 4–6 mm. long; corolla commonly 1–2 cm. broad; filaments dilated, pubescent; anthers about as long as the filaments; fruit-heads less than 1 cm. in diameter;

achenes cuneate, 1.5 mm. long, winged, with one facial wing or crest, the beak short, lateral, spreading.

TYPE LOCALITY: Canada.
DISTRIBUTION: Newfoundland to Saskatchewan, Florida, and Texas.
ILLUSTRATIONS: Rep. Mo. Bot. Gard. 6: *pl. 19;* Britt. & Brown, Ill. Fl. *f. 204;* Engler, Pflanzenreich 4^{15}: *f. 18.*

14. **Sagittaria Chapmanii** (J. G. Smith) C. Mohr, Bull. Torrey Club **24**: 20. 1897.

Sagittaria graminea Chapmanii J. G. Smith, Rep. Mo. Bot. Gard. 6: 52. 1894.

Plants usually emersed, 3–9 dm. tall; leaves various, often partially represented by flat phyllodia usually 10–30 cm. long, the blades linear or lanceolate, 15–20 cm. long, acute, usually much shorter than the petioles; scapes erect or assurgent, usually branched; whorls of the inflorescence often numerous; pedicels spreading or ascending, those of the pistillate heads 1.5–3 cm. long; bracts lanceolate, 6–12 mm. long, acute or acuminate, slightly united at the base; sepals ovate or oblong-ovate, becoming 4.5–5.5 mm. long; corolla mostly 1–2 cm. broad; filaments dilated, pubescent; anthers as long as the filaments or nearly so; fruit-heads about 5 mm. in diameter; achenes cuneate, about 1 mm. long, wingless, the beak short, lateral and above the middle of the body.

TYPE LOCALITY: West Florida.
DISTRIBUTION: Georgia, Florida, and Alabama.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 21.*

15. **Sagittaria papillosa** Buch. Abh. Nat. Ver. Bremen **2**: 44. 1869.

Sagittaria lancifolia papillosa Micheli, in DC. Monog. Phan. **3**: 74. 1881.

Plants mostly emersed, 3–10 dm. tall; leaves erect or nearly so, the blades linear or linear-lanceolate, 10–15 cm. long, acute, as long as the petioles or shorter; scapes usually longer than the leaves, mostly branched; whorls of the inflorescence three to ten or more, the lower ones remote; pedicels of pistillate flowers 1–1.5 cm. long; bracts ovate, 3–4 mm. long, densely granular-papillose, united to about the middle; sepals ovate, roughened like the bracts, becoming 5–6 mm. long; corollas 2–3 cm. broad; filaments not dilated, glabrous; fruit-heads subglobose, 6–10 mm. in diameter; achenes cuneate, about 1.5 mm. long, the beak lateral and slightly above the middle of the achene-body.

TYPE LOCALITY: Not given [Texas].
DISTRIBUTION: Louisiana and Texas.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 25.*

16. **Sagittaria ambigua** J. G. Smith, Rep. Mo. Bot. Gard. **6**: 48. 1894.

Plants mostly emersed, 3–8 dm. tall; leaves erect, the blades lanceolate, 12–50 cm. long, 5-nerved, shorter than the petioles; scapes as long as the leaves or surpassing them, simple; whorls of the inflorescence rather numerous, commonly 8–15; pedicels mostly ascending, those of the pistillate flowers longer than those of the staminate; bracts lanceolate, 10–15 mm. long, united at the base; sepals oblong or nearly so, becoming 6–8 mm. long; filaments not dilated, glabrous; anthers shorter than the filaments; fruit-heads 12–15 mm. in diameter; achenes oblong, slightly curved, 2 mm. long, narrowly winged, each prolonged into a short horizontal beak at the top.

TYPE LOCALITY: Oklahoma.
DISTRIBUTION: Kansas and Oklahoma.
ILLUSTRATIONS: Rep. Mo. Bot. Gard. 6: *pl. 17;* Britt. & Brown, Ill. Fl. *f. 199;* Engler, Pflanzenreich 4^{15}: *f. 16, E, F* (fruit).

17. **Sagittaria falcata** Pursh, Fl. Am. Sept. 397. 1814.

Sagittaria lancifolia falcata J. G. Smith, Mem. Torrey Club 5: 25. 1894.

Plants emersed or partially submerged, 8–15 dm. tall; leaves erect or nearly so, the blades almost linear to elliptic, mostly 1–4 dm. long, often slightly acuminate, much shorter

than the petioles; scapes simple or sparingly branched; whorls of the inflorescence few or many; pedicels of the pistillate flowers 1–2 cm. long, usually much shorter than those of the staminate flowers; bracts ovate, less than 1 cm. long, obtuse or acutish, granular-papillose; sepals obtuse; corollas 3–4 cm. broad; filaments not dilated, pubescent; anthers shorter than the filaments; fruit-heads 1–1.5 cm. in diameter; achenes cuneate, about 2 mm. long, narrowly winged, the slender beak usually ascending.

TYPE LOCALITY: Carolina.
DISTRIBUTION: Delaware to Florida, Texas, and Mexico.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 16, f. 3, 4, 5.*

18. **Sagittaria lancifolia** L. Pl. Jam. Pug. 27. 1759.

?*Sagittaria Sellowiana* Kunth, Enum. 3: 159. 1841.
?*Sagittaria plantaginifolia* Mart. & Gal. Bull. Acad. Roy. Belg. 9²: 379. 1842.
Sagittaria lancifolia major Micheli, in DC. Monog. Phan. 3: 73. 1881.
Sagittaria lancifolia media Micheli, in DC. Monog. Phan. 3: 73. 1881.

Plants emersed or partially submerged, 4–20 dm. tall; leaves erect or ascending, the blades leathery, broadly linear to elliptic, 3–6 dm. long, acute, commonly shorter than the petioles; scapes mostly taller than the leaves, usually branched, sometimes widely so; whorls of the inflorescence numerous; pedicels of the pistillate flowers ascending, often shorter than those of the staminate; bracts lanceolate to linear-lanceolate, 1–2.5 cm. long, acute or acuminate, striate; sepals obtuse; corollas 4–5 cm. broad; petals obovate; filaments not dilated, pubescent; anthers shorter than the filaments; fruit-heads fully 1 cm. in diameter; achenes cuneate and more or less falcate, 2–3 mm. long, gradually narrowed into the prominent beak, the dorsal wing thick and even.

TYPE LOCALITY: Jamaica.
DISTRIBUTION: Florida to Texas, Mexico, central and northern South America, and the West Indies.
ILLUSTRATIONS: Andr. Bot. Repos. 5: *pl. 333;* Bot. Mag. *pl. 1792;* Redouté, Lil. *pl. 411;* Rep. Mo. Bot. Gard. 6: *pl. 16, f. 1, 2.*

19. **Sagittaria angustifolia** Lindl. Bot. Reg. *pl. 1141.* 1828.

Sagittaria lancifolia angustifolia Lindl.; Griseb. Cat. Pl. Cuba 218. 1866.

Plants wholly or partially emersed, 7–12 dm. tall; leaves ascending or recurving, the blades leathery, linear or nearly so, sometimes very narrow, 1–4 dm. long, attenuate, as long as the petioles or shorter; scapes as long as the leaves or longer, usually simple; whorls of the inflorescence several; pedicels of the pistillate flowers ascending, as long as those of the staminate ones or slightly shorter; bracts lanceolate, sometimes broadly so, 0.5–1.5 cm. long, acute or acuminate; sepals obtuse; corollas 2–3 cm. broad; filaments not dilated, pubescent; anthers as long as the filaments or shorter; fruit-heads 1–1.5 cm. in diameter; achenes cuneate or obliquely obovate, 2–2.5 mm. long, abruptly narrowed into the minute beak, the dorsal wing usually crested.

TYPE LOCALITY: Essequibo, British Guiana.
DISTRIBUTION: Georgia, Alabama, and Mississippi, and in tropical America.
ILLUSTRATION: Bot. Reg. *pl. 1141.*

20. **Sagittaria macrocarpa** J. G. Smith, Rep. Mo. Bot. Gard. 6: 53. 1894.

Plants mostly emersed, 3–4 dm. tall; leaves phyllodium-like, erect or nearly so, the blades rather imperfect, linear or linear-lanceolate, 5–7 cm. long, much shorter than the petioles; scapes erect, overtopping the leaves; whorls of the inflorescence 3–5, the lowest 2 whorls, or only the lowest, pistillate; pedicels about as long as the internodes except those of the pistillate flowers, which are much shorter; bracts ovate, about 3 mm. long, acute, united at the base; filaments dilated, pubescent; anthers about as long as the filaments; fruit-heads 10–12 mm. in diameter; achenes obovate or oblong-obovate, 3 mm. long, winged, the beak ascending, rather stout.

TYPE LOCALITY: South Carolina.
DISTRIBUTION: North Carolina and South Carolina.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 23.*

21. **Sagittaria rigida** Pursh, Fl. Am. Sept. 397. 1814.

Sagittaria heterophylla Pursh, Fl. Am. Sept. 396. 1814. Not *S. heterophylla* Schreb. 1811.
Sagittaria heterophylla angustifolia Engelm. in A. Gray, Man. ed. 5. 494. 1867.
Sagittaria heterophylla elliptica Engelm. in A. Gray, Man. ed. 5. 494. 1867.

Plants emersed and erect or nearly so, or submerged and sometimes greatly elongate; leaves various, the phyllodia gradually tapering, the blade-bearing ones usually present, the blades 5–20 cm. long, linear, lanceolate, elliptic, or broadly ovate, 7–9-nerved, acute or cordate at the base, sometimes with 1 or 2 spreading or recurved basal lobes; scapes 1–8 dm. long, commonly shorter than the leaves, usually bent and sometimes branched at the lower whorl of the inflorescence; pedicels of the pistillate flowers (1 or 2 lower whorls) barely 1 cm. long, or nearly wanting; bracts ovate, obtuse, 4–8 mm. long, united at the base; sepals ovate or oblong-ovate, becoming 6–8 mm. long; corolla 2–3 cm. broad or sometimes smaller; filaments dilated, finely pubescent; anthers very broad, shorter than the filaments; fruit-heads 8–15 mm. in diameter, bristly by the protruding beaks of the achenes; achenes cuneate, 3–4 mm. long, winged, the beak stout, ascending.

TYPE LOCALITY: Oswego River, New York.
DISTRIBUTION: Quebec to Minnesota, New Jersey, Tennessee, and Nebraska.
ILLUSTRATIONS: Bot. Mag. *pl. 1632;* Britt. & Brown, Ill. Fl. *f. 201;* Rep. Mo. Bot. Gard. 6: *pl. 18.*

22. **Sagittaria longiloba** Engelm. Bot. Mex. Bound. Surv. 212. 1858.

Sagittaria sagittifolia mexicana Mart. & Gal. Bull. Acad. Roy. Belg. 9^2: 379. 1842. Not *S. mexicana* Steud. 1841.

Plants mostly emersed, 3–15 dm. tall; leaf-blades 9–23 cm. long, the terminal lobe linear to lanceolate, the basal lobes linear or linear-lanceolate, twice or thrice as long as the terminal one, long-acuminate; scapes simple or rarely branched; whorls of the inflorescence 4–8 or more, remote, the one to three lower ones with pistillate flowers; pedicels slender, 15–35 mm. long, spreading; bracts lanceolate, 6–8 mm. long, acuminate; sepals oblong, oval or obovate, becoming 6–7 mm. long; corolla 1.5–2.5 cm. broad; filaments not dilated, glabrous; anthers oblong, shorter than the filaments; fruit-heads 10–15 mm. in diameter; achenes cuneate, 1 mm. long, the margins somewhat undulate, the beak very short, lateral.

TYPE LOCALITY: San Elceario.
DISTRIBUTION: Nebraska and Colorado to Texas and Mexico.
ILLUSTRATIONS: Rep. Mo. Bot. Gard. 6: *pl. 11;* Britt. & Brown, Ill. Fl. *f. 198;* Engler, Pflanzenreich 4^{15}: *f. 14.*

23. **Sagittaria Greggii** J. G. Smith, Rep. Mo. Bot. Gard. **6**: 43. 1894.

Plants partially emersed, 9–15 dm. tall; leaf-blades hastate, 20–40 cm. long, the terminal lobe ovate to lanceolate, acute or slightly acuminate, the basal lobes lanceolate or linear-lanceolate, acuminate, about as long as the terminal one or longer; scapes 5-angled near the base, branched; whorls of the inflorescence several or many; bracts lanceolate or linear-lanceolate, acuminate, 15–30 mm. long; pedicels of the lower whorls 15–30 mm. long, mostly ascending; sepals oval to obovate, becoming 6–8 mm. long; corolla mostly 1–2 cm. broad, or more; filaments not dilated, glabrous; anthers about as long as the filaments or shorter; fruit-heads 8–15 mm. in diameter; achenes obovate to orbicular-obovate, 2–3 mm. long, thick-margined, the beak minute.

TYPE LOCALITY: Mexico.
DISTRIBUTION: California and Mexico.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 12.*

24. **Sagittaria brevirostra** Mackenzie & Bush, Rep. Mo. Bot. Gard. **16**: 102. 1905.

Sagittaria variabilis diversifolia Engelm. in A. Gray, Man. ed. 5. 493. 1867.

Plants mostly emersed, 4–8 dm. tall; leaf-blades sagittate, 25–40 cm. long, the terminal lobe lanceolate or linear-lanceolate, acuminate, the basal lobes narrowly lanceolate or almost

linear, acuminate, as long as the terminal lobe or somewhat longer; scapes usually taller than the leaves, 4–6-angled, simple or branched; whorls of the inflorescence several or numerous; bracts lanceolate or linear-lanceolate, mostly 3–5 cm. long, attenuate; pedicels straight, those of the pistillate flowers 1–2 cm. long, those of the staminate flowers longer; sepals ovate, becoming 10–12 mm. long; corolla about 2.5 cm. broad; filaments not dilated, glabrous; fruit-heads 2–3 cm. in diameter; achenes cuneate-obovate to suborbicular, about 2.5 mm. long, broadly winged, the minute beak erect over the ventral wing.

TYPE LOCALITY: Western Missouri.
DISTRIBUTION: Nova Scotia to Wisconsin, Missouri, and Kansas.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 7.*

25. **Sagittaria cuneata** Sheldon, Bull. Torrey Club **20**: 283. 1893.

?*Sagittaria sagittifolia minor* Pursh, Fl. Am. Sept. 395. 1814.
Sagittaria arifolia Nutt.; J. G. Smith, Rep. Mo. Bot. Gard. 6: 32. 1894.
Sagittaria arifolia stricta J. G. Smith, Rep. Mo. Bot. Gard. 6: 34. 1894.
Sagittaria paniculata Blankinship, Mont. Agr. Coll. Sci. Stud. 1: 40. 1905.
Sagittaria arifolia monomorpha Lunell, Bull. Leeds Herb. 1[1]: [2]. 1907.
Sagittaria arifolia dimorpha Lunell, Bull. Leeds Herb. 1[1]: [3]. 1907.
Sagittaria arifolia polymorpha Lunell, Bull. Leeds Herb. 1[1]: [3]. 1907.
Sagittaria arifolia cuneata Lunell, Bull. Leeds Herb. 1[1]: [3]. 1907.

Plants emersed and commonly 2–4 dm. tall, or submerged and varying in length with depth of the water, sometimes over 1 m. long; leaf-blades hastate to sagittate, 6–18 cm. long, the terminal lobe ovate to lanceolate, or rarely nearly linear, mostly acute or slightly acuminate, the basal lobes much narrower than the terminal one and longer than it or shorter, acute or acuminate, except sometimes in the case of imperfectly developed blades; phyllodia, when present, either relatively short and linear-lanceolate, or elongate and linear-attenuate; scapes as long as the leaves or commonly shorter, simple or branched; whorls of the inflorescence few or numerous; bracts lanceolate or linear-lanceolate, or rarely ovate-lanceolate, acuminate; pedicels straight, ascending, mostly 10–25 mm. long, or sometimes very short, those of the staminate flowers usually about twice as long as those of the pistillate flowers; sepals ovate to oblong-ovate, becoming 6–8 mm. long; corolla 2–2.5 cm. broad; filaments not dilated, glabrous; anthers oblong, as long as the filaments or longer; fruit-heads 1–1.5 cm. in diameter; achenes obovate, 2–2.5 mm. long, with callous-thickened wings, the beak minute, erect over the ventral wing.

TYPE LOCALITY: East Battle Lake, Otter Tail County, Minnesota.
DISTRIBUTION: Nova Scotia and Maine to Quebec, British Columbia, Connecticut, Kansas, New Mexico, and California.
ILLUSTRATIONS: Bull. Torrey Club 20: *pl. 159;* Britt. & Brown, Ill. Fl. *f. 196* (as *S. arifolia*) *f. 197;* Rep. Mo. Bot. Gard. 6: *pl. 1;* Engler, Pflanzenreich 4[15]: *f. 16, A, B, C* (stamens and fruit).

26. **Sagittaria hebetiloba** A. Nelson, Bull. Torrey Club **26**: 6. 1899.

Plants partially emersed, 2–5 dm. tall; leaf-blades ovate or ovate-hastate, 8–14 cm. long, the terminal lobe broadly ovate, the basal lobes ovate, much shorter and smaller than the terminal one, obtuse or rounded; scapes erect, simple or sparingly branched; whorls of the inflorescence rather few; bracts linear-lanceolate, 1.5–2 cm. long, acuminate; pedicels 1.5–2.5 cm. long, the pistillate and staminate about equal in length; sepals oval or ovate, becoming 7–8 mm. long; corolla about 2 cm. wide; filaments not dilated, glabrous; anthers about as long as the filaments; fruit-heads 10–15 mm. in diameter; achenes obovate, about 2 mm. long, winged all around, the beak minute, erect or nearly so over the ventral wing.

TYPE LOCALITY: Platte Cañon, Laramie County, Wyoming.
DISTRIBUTION: Known only from the type locality.

27. **Sagittaria pubescens** Muhl. Cat. 86. 1813.

Sagittaria sagittifolia pubescens Torr. Comp. 356. 1826.
Sagittaria variabilis pubescens Engelm. in A. Gray, Man. ed. 5. 493. 1867.
Sagittaria latifolia pubescens J. G. Smith, Mem. Torrey Club 5: 25. 1894.

Plants partially or wholly emersed, 2–6 dm. tall; leaves erect or nearly so, the blades oblong or broadly ovate, or rarely hastate or sagittate, 8–25 cm. long, pubescent, the terminal lobe ovate, orbicular-ovate or lanceolate, usually abruptly pointed; the basal lobes

ovate to lanceolate, about one half as long as the blade or longer; scapes 3–6 dm. tall, pubescent; whorls of the inflorescence remote; pedicels variable in length, sometimes surpassing the bracts; bracts ovate or suborbicular, obtuse, 7–10 mm. long, densely pubescent; sepals orbicular-ovate to reniform, pubescent; filaments not dilated, glabrous; fruit-heads 8–15 mm. in diameter; achenes somewhat anvil-shaped or resembling the head of a bird, 2–3 mm. long, the beak horizontal or somewhat declined, mostly longer and firmer than that of *S. latifolia*.

TYPE LOCALITY: Pennsylvania.
DISTRIBUTION: New Jersey and Pennsylvania to western Tennessee, Alabama, and Florida.
ILLUSTRATION: Rep. Mo. Bot. Gard. **6**: *pl. 8*.

28. **Sagittaria latifolia** Willd. Sp. Pl. **4**: 409. 1806.

Sagittaria sagittifolia L. Sp. Pl. 993, in part. 1753.
Sagittaria obtusa Willd. Sp. Pl. **4**: 409. 1806.
Sagittaria gracilis Pursh, Fl. Am. Sept. 396. 1814.
Sagittaria simplex Pursh, Fl. Am. Sept. 396. 1814.
Sagittaria hastata Pursh, Fl. Am. Sept. 396. 1814.
Sagittaria sagittifolia latifolia Torr. Comp. 355. 1826.
Sagittaria sagittifolia hastata Torr. Comp. 355. 1826.
Sagittaria sagittifolia gracilis Torr. Comp. 356. 1826.
Sagittaria sagittifolia macrophylla Hook. Fl. Bor. Am. **2**: 167. 1838.
Sagittaria sagittifolia vulgaris Hook. Fl. Bor. Am. **2**: 167. 1838.
Sagittaria variabilis Engelm. in A. Gray, Man. 461. 1848.
Sagittaria variabilis angustifolia Engelm. in A. Gray, Man. ed. 5. 493. 1867.
Sagittaria variabilis gracilis Engelm. in A. Gray, Man. ed. 5. 493. 1867.
Sagittaria variabilis obtusa Engelm. in A. Gray, Man. ed. 5. 493. 1867.
Sagittaria variabilis latifolia Engelm. in A. Gray, Man. ed. 5. 493. 1867.
Sagittaria sagittifolia variabilis Micheli, in DC. Monog. Phan. **3**: 69. 1881.
Sagittaria chinensis Parish, Zoe 1: 122. 1890. Not *S. sinensis* Sims. 1833.
Sagittaria sagittifolia sinensis Brand. Zoe **4**: 217. 1893. Not *S. sinensis* Sims. 1833.
Sagittaria esculenta Howell, Fl. NW. Am. 679. 1903.
Sagittaria latifolia glabra Buch. in Engler, Pflanzenreich **4**[15]: 50. 1903.

Plants partially or wholly emersed, 2–14 dm. tall; leaves very variable, mostly erect or ascending, the blades sometimes broader than long, 10–40 cm. long, glabrous, the terminal lobe varying from deltoid or ovate to linear, the basal lobes ovate, lanceolate, or linear, acute or acuminate; scape erect, angled, glabrous; bracts ovate, mostly less than 1 cm. long, glabrous, acute or obtusish; whorls of the inflorescence mostly distant; pedicels variable, those bearing pistillate flowers 2–5 cm. long or longer, or sometimes shorter; filaments not dilated, glabrous; fruit-heads 1.5–3 cm. in diameter; achenes obovate, usually broadly so, about 3 mm. long, broadly winged, especially at the top, the beak horizontal or nearly so.

TYPE LOCALITY: Canada to Carolina.
DISTRIBUTION: New Brunswick and Nova Scotia to British Columbia, Florida, California, Mexico, and Central America.
ILLUSTRATIONS: Rep. Mo. Bot. Gard. 6: *pl. 3–6* (except *pl. 3, f. 4, pl. 4, f. 3, 6*); Britt. & Brown, Ill. Fl. *f. 195*; Engler, Pflanzenreich **4**[15]: *f. 16, D* (fruit).

29. **Sagittaria mexicana** Steud. Nom. Bot. ed. 2. 491. 1841.

Sagittaria macrophylla Zucc. Abh. Akad. Muench. **1832**: 289. 1832. Not *S. macrophylla* Bunge. 1831.

Plants mostly emersed, 3–11 dm. tall; leaves erect or nearly so; blades lanceolate to oblong-lanceolate, sometimes hastate, 8–20 cm. long, acute or acuminate, the basal lobes, when present, narrow, spreading or recurved, much shorter than the terminal lobe; scapes about as tall as the leaves, simple; whorls of the inflorescence few, usually 3–5; pedicels much longer than the bracts, those of the pistillate flowers 5–7 cm. long, much longer than those of the staminate; bracts broad, united nearly to the apex, glabrous; sepals oblong to ovate, becoming 8–10 mm. long, glabrous; filaments not dilated, glabrous; anthers oblong, shorter than the filaments; fruit-heads very long-pedicelled; achenes (partially mature) broadly winged, the beak long, horizontal.

TYPE LOCALITY: Mexico.
DISTRIBUTION: Mexico.
ILLUSTRATION: Rep. Mo. Bot. Gard. 6: *pl. 27*.

30. **Sagittaria viscosa** C. Mohr, Bull. Torrey Club **24**: 19. 1897.

Plants mostly emersed, 4–8 dm. tall; leaves erect or nearly so, the blades broadly ovate, 2–3.5 dm. long, rounded to the apiculate apex; the basal lobes ovate, acute or acuminate, as long as the terminal lobe or shorter; scapes erect, overtopping the leaves, or rarely shorter, simple or branched; whorls of the inflorescence mostly 8–10; pedicels slender, of nearly equal length throughout; bracts leathery, ovate or ovate-oblong, obtuse, papillose, rugose and viscid; sepals leathery, becoming 7–8 mm. long, roughened and viscid like the bracts; corollas fully 1 cm. broad; filaments not dilated, pubescent; anthers shorter than the filaments; achenes not seen.

TYPE LOCALITY: Along the Mobile River, Alabama.
DISTRIBUTION: Southern Alabama and Florida.
ILLUSTRATION: Bull. Torrey Club **24**: *pl. 289.*

31. **Sagittaria Engelmanniana** J. G. Smith, Rep. Mo. Bot. Gard. **6**: 41. 1894.

Sagittaria variabilis (*?*) *gracilis* S. Wats. in A. Gray, Man. ed. 6. 555, in part. 1889. Not *S. variabilis gracilis* Engelm. 1856.

Plants emersed or sometimes partially submerged, 2–9 dm. tall; leaves erect or nearly so, the blades narrow, 8–20 cm. long, the terminal lobe linear to lanceolate, the basal lobes linear or nearly so, commonly about as long as the terminal lobe; scapes about as tall as the leaves, simple; whorls of inflorescence 5–6, remote; bracts ovate or ovate-lanceolate, 8–12 mm. long, obtuse or acutish; pedicels ascending, those of the staminate flowers often longer than those of the pistillate; sepals ovate, becoming 7–8 mm. long, acute; filaments not dilated, glabrous; anthers shorter than the filaments; fruit-heads subglobose, 12–16 mm. in diameter; achenes cuneate, 4–4.5 mm. long, with 2 usually prominent facial wings on each side and sometimes a less prominent wing between them, the slender beak erect, but often curved inward or outward at the apex, one half as long as the achene-body or less.

TYPE LOCALITY: Uxbridge, Massachusetts.
DISTRIBUTION: Massachusetts, Connecticut, and Rhode Island.
ILLUSTRATIONS: Rep. Mo. Bot. Gard. 6: *pl. 9;* Britt. & Brown, Ill. Fl. *f. 194.*

32. **Sagittaria longirostra** (Micheli) J. G. Smith, Mem. Torrey Club **5**: 26. 1894.

Sagittaria sagittifolia (*?*) *longirostra* Micheli, in DC. Monog. Phan. **3**: 69. 1881.

Plants emersed or partially submerged, 4–9 dm. tall; leaves erect or nearly so, the blades broad or narrow, 10–25 cm. long, the terminal lobe broadly ovate to linear, abruptly pointed or acuminate, the basal lobes ovate or oblong-lanceolate or narrowly linear, acute or acuminate, about one half as long as the blade or more; scapes erect, longer than the leaves, sharply 6-angled; whorls of the inflorescence few or several; bracts lanceolate or linear-lanceolate, acuminate; pedicels of the lower whorls 5–10 mm. long or rarely more; sepals becoming 6–8 mm. long; filaments not dilated, glabrous; anthers shorter than the filaments; fruitheads spheroidal, 12–18 mm. in diameter; achenes obovate or orbicular-obovate, 4 mm. long, with a broad and high, undulate or crest-like dorsal wing and usually a single prominent facial wing on each side, the beak erect, but more or less curved at the tip, about one half as long as the body.

TYPE LOCALITY: Alabama.
DISTRIBUTION: New Jersey and Pennsylvania to Florida and Alabama.
ILLUSTRATIONS: Britt. & Brown, Ill. Fl. *f. 193;* Rep. Mo. Bot. Gard. **6**: *pl. 10.*

33. **Sagittaria australis** (J. G. Smith) Small, Fl. SE. U. S. 45. 1903.

Sagittaria longirostra australis J. G. Smith; C. Mohr, Bull. Torrey Club **24**: 20. 1897.

Plants emersed, 2–5 dm. tall; leaves erect or nearly so, the blades oval or suborbicular, 8–10 cm. long, abruptly pointed at the apex, ciliate, the terminal lobe usually broader than long, the basal lobes ovate, barely one half as long as the blade, obtuse; scapes erect, pubescent about the nodes in the inflorescence, angled, overtopping the leaves; whorls of the inflorescence 4–6, remote; bracts lanceolate, acuminate; pedicels of lower whorls 10–13

mm. long; sepals oblong or ovate-oblong, becoming 5–7 mm. long; filaments not dilated, glabrous; anthers shorter than the filaments; fruit-heads 15 mm. in diameter or less; achenes broadly obovate, 3–3.5 mm. long, with a broad undulate or crested dorsal wing and usually prominent facial wings, the erect beak curved over the top of the crest, one half as long as the body.

TYPE LOCALITY: Cullman, Alabama.
DISTRIBUTION: Alabama.
ILLUSTRATION: Bull. Torrey Club 24: *pl. 291.*

34. **Sagittaria intermedia** Micheli, in DC. Monog. Phan. 3: 80. 1881.

Sagittaria acutifolia Griseb. Cat. Pl. Cuba 218. 1866. Not *S. acutifolia* L. 1753.

Plants emersed or partially submerged, 2–5 dm. tall; leaves erect or nearly so, the blades sagittate, hastate or triangular-hastate, 5–15 cm. long, the terminal lobe lanceolate to deltoid, acute or obtusish, the basal lobes narrower and longer than the terminal lobe, except in cases of imperfectly developed blades, acute or acuminate; scapes erect, commonly shorter than the leaves, simple or branched; whorls of the inflorescence few or many; bracts ovate, obtuse, partially united; pedicels 5–15 mm. long, those of the pistillate flowers shorter and much thicker than those of the staminate flowers; sepals ovate to orbicular-ovate, becoming 6–8 mm. long; filaments not dilated, glabrous; anthers about as long as the filaments; fruit-heads 11–15 mm. in diameter; achenes 1.5–2 mm. long, obovate-cuneate, with the rather broad dorsal wing crest-like and the faces tuberculate, the beak minute, horizontal.

TYPE LOCALITY: Not given [Cuba].
DISTRIBUTION: Cuba and Jamaica.
ILLUSTRATIONS: Descourt. Fl. Ant. *pl. 497;* Engler, Pflanzenreich 4[15]: *f. 13, c* (fruit).

35. **Sagittaria montevidensis** Cham. & Schlecht. Linnaea 2: 156. 1827.

Plants emersed or partially submerged, 5–17 dm. tall; leaves erect or nearly so, the blades hastate or sagittate, 1–6 dm. long, often as broad, glabrous above, sparingly scabrous on the veins beneath, the terminal lobe linear, lanceolate, deltoid, or orbicular-deltoid, the basal lobes acute or acuminate, more or less divergent, about as long as the terminal lobe; scapes stout, sometimes 6–8 cm. thick at the base, simple or branched; whorls of the inflorescence several or numerous, 2–4 of the lower ones pistillate; bracts lanceolate, acuminate, united below; pedicels of the staminate flowers slender, 2–5 cm. long, surpassing those of the pistillate flowers; sepals becoming 10–15 mm. long, obtuse; corolla 2–4 cm. broad; filaments not dilated, glandular-pubescent, longer than the anthers; fruit-heads 1.5–3 cm. in diameter; achenes cuneate to rhombic-obovate, 2–3 mm. long, winged, the beak slender, horizontal or oblique, the faces unappendaged.

TYPE LOCALITY: Montevideo, Brazil.
DISTRIBUTION: North Carolina to Florida, and in California. Naturalized from South America.
ILLUSTRATIONS: Bot. Mag. *pl. 6755;* Rep. Mo. Bot. Gard. 6: *pl. 29;* Engler, Pflanzenreich 4[15]: *f. 13, G, H,* and *J* (stamen and fruit).

Family 3. BUTOMACEAE

By George Valentine Nash

Perennial aquatic or swamp herbs, usually lactescent, except in *Butomus*, with leaves basal, or with these sometimes arranged along an extended stem, the blades ensiform or flat and dilated, and with regular hermaphrodite flowers, the sepals and petals imbricated. Sepals 3, persistent, usually coriaceous, commonly green, or sometimes resembling the petals. Petals 3, thin, usually fugacious, sometimes persistent, commonly larger than the sepals. Stamens hypogynous, free, either 9, with 6 opposite the sepals and 3 opposite the petals, or numerous and disposed in many whorls, the external sterile; filaments flattened; anthers attached at the base, 2-celled, dehiscing laterally by a longitudinal fissure; pollen spheric. Carpels 1-celled, usually 6. Ovules numerous, anatropous. Stigmas sessile, inserted at the apex of the ovary, or at the apex and inner face of the style. Fruiting carpels 1-celled, free or more or less united, dehiscing on the inner side. Seeds numerous, small, curved or straight, the testa smooth or cristate; embryo without endosperm, hippocrepiform, or rarely straight.

Stamens 9, all fertile; embryo straight; plants not lactescent. 1. Butomus.
Stamens numerous, the external sterile; embryo hippocrepiform; plants lactescent. 2. Limnocharis.

1. BUTOMUS L. Sp. Pl. 372. 1753.

Glabrous aquatic herbaceous perennials, with the leaves all basal, the blades ensiform, and the hermaphrodite long-pedicellate flowers arranged in an umbel. Sepals 3, persistent, resembling the petals. Petals 3, larger than the sepals, persistent. Stamens 9, all fertile, the filaments subulate. Carpels 6, united at the base. Styles apical, short, persistent, stigmatic on the inner side. Fruiting carpels 6, coriaceous, united at the base and crowned with the persistent style, dehiscing on the inner side. Seeds numerous, small, longitudinally striate, with a straight embryo.

Type species, *Butomus umbellatus* L.

1. Butomus umbellatus L. Sp. Pl. 372. 1753.

A glabrous perennial with a thick horizontal rootstock. Leaves erect; sheath compressed, keeled, gradually narrowed above into the blade, which is ensiform above, more or less twisted, acute, gradually narrowed toward the apex, 3–10 dm. long, 2–10 mm. wide; scape erect, terete, smooth, up to 1 m. tall or more and usually exceeding the leaves; inflorescence many-flowered, the mature pedicels 4–10 cm. long; sepals and petals elliptic, 1–1.5 cm. long, rose, the sepals somewhat tinged with green.

Type locality: Europe.
Distribution: Introduced along the shores of the St. Lawrence River, near Montreal, Quebec. Native of Europe and Asia.
Illustrations: Fl. Dan. *pl. 604*; Engl. Bot. *pl. 651*; Sv. Bot. *pl. 296*.

2. LIMNOCHARIS H. & B. Pl. Aequin. 1: 116. 1807.

Perennial aquatic plants, with flat leaf-blades, and an umbellate inflorescence borne on a scape, the flowers on long pedicels. Flowers hermaphrodite. Sepals 3, persistent. Petals 3, thin, fugacious. Stamens numerous, the outer ones sterile. Carpels 15–20, laterally compressed. Styles wanting. Stigmas sessile, extrorse. Fruiting carpels thickened on the furrowed back, the sides membranous, hyaline, dehiscing on the inner side.

Seeds hippocrepiform, with a crustaceous testa, transversely undulate-cristate; embryo hippocrepiform.

Type species, *Alisma flava* L.

Leaf-blades large, broadly elliptic to ovate, often cordate at the base; fruiting carpels 12–15 mm. long, semicircular; scapes over 3 dm. tall. 1. *L. flava.*

Leaf-blades small, narrowly elliptic, 4 cm. long or less, less than 1 cm. wide, acute at both ends; fruiting carpels 8–10 mm. long, 3–4 mm. broad; scapes under 3 dm. tall. 2. *L. Laforesti.*

1. **Limnocharis flava** (L.) Buch. Abh. Nat. Ver. Bremen **2**: 2. 1868.

Alisma flava L. Sp. Pl. 343. 1753.
Damasonium flavum Mill. Gard. Dict. ed. 8. 1768.
Limnocharis emarginata H. & B. Pl. Aequin. 1: 116. 1807.
Limnocharis Plumieri Rich. Mem. Mus. Paris 1: 374. 1815.

A perennial aquatic or marsh plant, with short thick rootstock, large flat broad leaf-blades, and showy yellow flowers. Leaves basal and exceeding the scape; sheath compressed, keeled on the back, gradually narrowed above into the long petiole which is sharply 3-angled, the angles usually winged; blade elliptic to orbicular, sometimes cordate at the base, usually apiculate at the rounded or sometimes emarginate apex, up to 3 dm. long and 1.5 dm. wide; scape erect, up to 4 dm. tall, angled, the angles often winged above; umbel when mature of 7–15 flowers, the mature pedicels stout, 3–5 cm. long, 3-angled, the angles winged and often undulate toward the thickened apex; sepals and petals broadly ovate to nearly orbicular, the former green, 12–18 mm. long, the petals thinner, longer than the sepals; fruiting carpels 12–15 mm. long, 6–8 mm. wide, semicircular; seeds 1–1.2 mm. long.

TYPE LOCALITY: South America.
DISTRIBUTION: Cuba, Haïti, Grenada, and in continental tropical America.
ILLUSTRATIONS: Plum. Pl. Am. *pl. 115;* H. & B. Pl. Aequin. 1: *pl. 34;* Mem. Mus. Paris 1: *pl. 19, f. 2, pl. 20;* Descourt. Fl. Ant. 8: *pl. 600;* Endl. Ic. Gen. Pl. *pl. 26;* Bot. Mag. *pl. 2525.*

2. **Limnocharis Laforesti** Duchas.; Griseb. Bonplandia **6**: 11. 1858.

Limnocharis flava minor Micheli, in DC. Monog. Phan. 3: 90. 1881.
Limnocharis mattogrossensis Kuntze, Rev. Gen. 3²: 324. 1898.

A small aquatic plant with small oblong-elliptic leaf-blades, and a few-flowered umbel. Leaves basal, up to 2 dm. long; sheath gradually narrowed into the petiole; blade 2–4 cm. long, 5–8 mm. wide, narrowly elliptic, acute at both ends; scape 2.5–6 cm. long, slender; umbel of 2 or 3 flowers, the pedicels 1.5–2 cm. long, slender, 3-angled; sepals broadly oval to nearly orbicular, obtuse, 8–10 mm. long; fruiting carpels much compressed, 8–10 mm. long and 3–4 mm. wide, acute; seeds 0.6–0.8 mm. long.

TYPE LOCALITY: In still water, Panama.
DISTRIBUTION: Panama, and Mattogrosso, Brazil.

Order **HYDROCHARITALES**

By John Kunkel Small

Aquatic or marsh-inhabiting caulescent or acaulescent herbs with rootstocks, the scapes, stems, and leaves usually succulent or spongy. Leaves alternate, often all basal; blades narrow and short or greatly elongate and usually sessile, or very wide and petioled. Flowers monoecious or dioecious or rarely perfect, arising from spathes, usually solitary, the pedicels sometimes greatly elongate. Perianth double or rarely single. Calyx of 3 herbaceous or petaloid sepals. Corolla of 3 thin petals, or wanting. Androecium of 3–12 stamens with distinct or united filaments. Gynoecium of 3–15 united carpels; ovary 1-celled and with several parietal placentae or 2–15-celled. Fruit a short or elongate berry or utricle.

Gynoecium 3-carpellary, or rarely 2-, 4- or 5-carpellary; ovary 1-celled, with 3, or rarely with 2, 4 or 5 parietal placentae; stigmas usually 3. Fam. 1. Elodeaceae.

Gynoecium 6–9-carpellary; ovary 6–9-celled (imperfectly so in *Hydromystia*); stigmas 6–9. Fam. 2. Hydrocharitaceae.

Family 1. **ELODEACEAE**

By Per Axel Rydberg

Submerged or floating water-plants, perennial, with rootstocks or stolons, sometimes acaulescent. Leaves opposite, whorled, or fascicled. Plants monoecious, dioecious, or polygamous. Flowers enclosed in a spathe, of 1–3, usually more or less united, bracts. Hypanthium in the pistillate flowers well developed, usually tubular, in the staminate flowers often short or obsclete. Perianth regular or nearly so. Sepals 3. Petals 3, often rudimentary, or wanting. Androecium of 3–12 stamens. Filaments short or none, sometimes monadelphous. Gynoecium of a single compound pistil. Ovary 1-celled with 2–5, usually 3, parietal placentae. Ovules usually numerous, orthotropous or anatropous. Fruit indehiscent, maturing under water. Seeds with a straight embryo, without endosperm.

Staminate flowers with 1–3 stamens; plants with horizontal rootstocks.
  Leaves opposite, on short erect lateral branches, more or less petioled, with broad blades; stigmas filiform; pollen filiform; marine plants. 1. Halophila.
  Leaves spiral, but in a basal cluster, linear, without petioles; stigmas short and broad; pollen spheroid; fresh-water plant, almost stemless. 2. Vallisneria.
Staminate flowers with 9 stamens; fresh-water plants, with floating stems and whorled leaves. 3. Philotria.

1. **HALOPHILA** Thouars (Gen. Nov. Madag 2; hyponym. 1806); Gaud. Voy. Freyc. Bot. 429. 1829.

Barkania Ehrenb. & Hempr.; Ehrenb. Abh. Akad. Berlin 1832: 429. 1834.

Small marine monoecious or dioecious plants with horizontal creeping scaly stems or rhizomes, rooting at the nodes, and with short erect branches. Scales and leaves in pairs, opposite, the latter in our species 3-ribbed. Flowers solitary or two enclosed in a 2-leaved sheath. Staminate flowers peduncled; sepals 3; anthers 3, sessile, erect, 2- or 4-celled, extrorse; pollen filiform. Pistillate flowers sessile; hypanthium flask-shaped with a slender neck; sepals 3, minute; styles 3, filiform, sessile, channeled and with usually two rows of papillae. Fruit membranous, with 3 parietal placentae; seeds many, in 2 rows, anatropous, ascending; cotyledon spirally twisted.

Type species, *Caulinia ovalis* R. Br.

Erect shoots with only one pair of leaves and no scales; leaf-blades minutely denticulate, almost entire-margined. 1. *H. Baillonis*.
Erect shoots with a pair of scales at the middle and 2 or 3 pairs of sub-verticillate leaves at the apex; leaf-blades spinulose-serrulate.
  Leaf-blades distinctly petioled, obtuse, with 3–5 pairs of transverse veins; petioles 3–5 mm. long. 2. *H. Acshersonii*.
  Leaf-blades subsessile or very short-petioled, acute, with 6–8 transverse veins; petioles less than 2 mm. long. 3. *H. Engelmanni*.

1. **Halophila Baillonis** Aschers. Jour. Linn. Soc. **14**: 317. 1874.

The horizontal stem or rhizome slender, filiform, its internodes 1–5 cm. long; scales two and two at the nodes, the lower horizontal, embracing the stem, the upper erect and enclosing the upright branches, obovate or cuneate, pubescent, hyaline; erect branches very short, 1–3 mm. long, bearing 2 leaves and sometimes a secondary horizontal stem; leaves slender-petioled; petioles 5–10 mm. long; blades very thin, hispidulous on both sides, oblong or elliptic, 1–3 cm. long, 3–8 mm. wide, acute at the base, obtuse at the apex, with a prominent midrib, two fainter lateral ribs, and about 6 pairs of transverse veins; flower-clusters usually of one lateral pistillate flower and one terminal staminate one in the axils of the leaves; bracts hyaline, ovate; staminate flower pedicelled; sepals 3, oval,

obtuse; anthers 3, subsessile, oblong, alternate, with the sepals, 2-celled, extrorse; pistillate flowers sessile; hypanthium lanceolate flask-shaped; sepals 3, minute, resembling small papillae; stigmas 3, sessile, filiform, with 2 rows of papillae; capsule about 5 mm. long; seeds about 20.

TYPE LOCALITY: Martinique.
DISTRIBUTION: On the bottoms of bays, from Martinique to St. Thomas, Porto Rico, and Jamaica.
ILLUSTRATION: Bih. Sv. Vet.-Akad. Handl. 9^{12}: *pl. 1–3*.

2. **Halophila Aschersonii** Ostenf. Bot. Tidsskr. **24**: 239. 1902.

Horizontal stem or rhizome creeping, slender, its internodes 1–3 cm. long; scales in pairs at the nodes, lanceolate, the lower horizontal, the upper erect, pubescent; erect shoots 1–4 cm. long, bearing 1 pair of obovate scales at the middle, in the axils of which often arise secondary rhizomes, and 2 pairs of leaves at the summit; leaves distinctly petioled; petioles 3–5 mm. long; leaf-blades elliptic, 8–20 mm. long, 4–8 mm. wide, obtuse at both ends, hispidulous, densely spinulose-serrate on the margins, 3-ribbed, with 3–5 pairs of transverse veins, thin; pistillate flowers sessile in the axils of the upper pairs of leaves, surrounded by two lanceolate acute bracts; hypanthium flask-shaped; body ovoid, 2 mm. long; tube slender, about 5 mm. long; sepals minute; stigmas 2 or 3, 15–30 mm. long; staminate flowers unknown.

TYPE LOCALITY: St. Croix, West Indies.
DISTRIBUTION: Muddy bottoms of bays at a depth of about 1 m., Danish West Indies, Porto Rico, and Jamaica.
ILLUSTRATION: Bot. Tidssk. **24**: 239. *f.*

3. **Halophila Engelmanni** Aschers. in Neumayer, Anleit. Wiss. Beob. 368. 1875.

Horizontal stems or rhizomes slender, creeping; internodes 2–4 cm. long; scales broadly obovate, glabrous, 3–4 mm. long; erect shoots 2–4 cm. long, with 1 pair of broadly obovate scales at the middle and usually 3 pairs of leaves at the summit; leaves subsessile or very short-petioled; petioles 2 mm. long or less; leaf-blades oblong or linear-oblong, usually acutish at both ends, 1–3 cm. long, 3–6 mm. wide, rather thick, faintly 3-ribbed and with 6–8 pairs of lateral veins, reticulate-roughened, densely spinulose-serrate on the margins; pistillate flowers in the axils of the leaves, enclosed by two lanceolate acuminate bracts; hypanthium flask-shaped; body ovoid, 3–4 mm. long; neck about 5 mm. long; sepals minute; stigmas 3, filiform, about 3 cm. long; staminate flowers unknown.

TYPE LOCALITY: Florida.
DISTRIBUTION: Bays and creeks, Florida and the Bahamas.

2. **VALLISNERIA** L. Sp. Pl. 1015. 1753.

Aquatic dioeceous submerged plants, almost stemless with perennial stoloniferous rootstocks. Leaves basal, ribbon-like, floating. Staminate flowers numerous, crowded on a spadix, enclosed in a 2–3-parted spathe, detached at maturity and floating and expanding on the surface of the water; perianth of 3 sepals; stamens 1–3, usually 2. Pistillate flowers solitary, at the ends of long slender scapes, floating on the water, subtended by a tubular 2-cleft spathe; hypanthium linear-cylindric; sepals and petals 3. Ovary 1-celled, with 3 parietal placentae. Stigmas 3, 2-lobed. Ovules numerous, orthotropous. Fruit cylindric, indehiscent.

Type species, *Vallisneria spiralis* L.

Stigmas 2-cleft for less than half their length; sepals 2–3 mm. long; pistillate peduncles usually spiral-twisted in fruit; leaves 3–8 mm. wide. 1. *V. spiralis*.
Stigmas 2-cleft to near the base; sepals 5–6 mm. long; pistillate peduncles scarcely spiral-twisted in fruit; leaves 6–20 mm. wide. 2. *V. americana*.

1. **Vallisneria spiralis** L. Sp. Pl. 1015. 1753.

Leaves thin, linear, 1–5 dm. long, 3–8 mm. wide, obtuse or acutish, usually minutely denticulate, especially towards the apex; peduncles of the staminate plant 1–5 cm. long;

spathe ovoid, 8–10 cm. long; peduncles of the pistillate plant thread-like, 3–6 dm. long, in fruit spirally twisting, drawing the fruit under water; spathe tubular, usually close around the flower, 1–1.5 cm. long; hypanthium in flower 1–2 cm. long, 1.5–2 mm. thick, in fruit 5–12 cm. long; sepals elliptic, 2–3 mm. long; petals minute; stigmas sessile, ovate in outline, 2-cleft for less than half their length.

TYPE LOCALITY: Pisa [Italy].
DISTRIBUTION: In water from Nova Scotia to Virginia, Indiana, and South Dakota; also in Europe and Asia.
ILLUSTRATIONS: Lam. Encyc. *pl. 799;* Dict. Sci. Nat. *pl. 78, 79;* Spach, Hist. Vég. *pl. 111;* Fl. Deuts. ed. 5, *pl. 386;* T. Nees, Gen. *pl. 431;* Britt. & Brown, Ill. Fl. *f. 208;* E. & P. Nat. Pfl. 2: *f. 185.*

2. **Vallisneria americana** Michx. Fl. Bor. Am. 2: 220. 1803.

Leaves thicker than in the preceding, linear, 3–6 dm. long, 6–20 mm. wide, obtuse, often minutely denticulate on the margin; peduncles of the pistillate plant 5–10 dm. long, curved, but scarcely spirally twisted in fruit; spathe 2–2.5 cm. long, rather loose; hypanthium in flowers 2.5–3 cm. long, fully 2 mm. thick, in fruit about 1 dm. long; sepals oval, 5–6 mm. long, rounded at the apex; petals about 2 mm. long; stigmas large, about 5 mm. long, 2-cleft to near the base; each division obliquely obovate, abruptly short-acuminate.

TYPE LOCALITY: Mississippi River.
DISTRIBUTION: Florida to Mississippi.

3. **PHILOTRIA** Raf. Am. Monthly Mag. 2: 175. 1818.

Elodea Michx. Fl. Bor. Am. 1: 20. 1803. Not *Elodes* Adans. 1763.
Udora Nutt. Gen. 2: 242. 1818.
Anacharis Bab. & Planch. Ann. Mag. Nat. Hist. II. 1: 81, mainly. 1848. Not *Anacharis* Rich. 1811.
Apalanthe Planch. Ann. & Mag. Nat. Hist. II. 1: 87. 1848.

Submerged water-plants with elongate branched stems, often rooting at the nodes. Leaves opposite or whorled, sessile, pellucid, 1-nerved and usually minutely denticulate. Plants usually dioecious or polygamo-dioecious, rarely with only perfect flowers. Spathes 2-cleft at the apex; that of the staminate plant in our species ovoid or obovoid, sessile or peduncled; in the pistillate or hermaphrodite plant lanceolate or lance-tubular. Staminate flowers solitary, rarely in threes, sessile or nearly so, early separating from the plant and floating on the surface of the water; sepals and petals 3; stamens 9, in two series, the outer of 6 and the inner of 3 stamens. Pistillate flowers solitary, sessile; hypanthium prolonged in a long, slender tube; sepals and petals 3; stamens none or represented by 3 rudimentary filaments. Hermaphrodite flowers like the pistillate ones, but with 3–9 stamens. Fruit linear or lance-linear. Seeds 3–21.

Type species, *Elodea canadensis* Michx.

Leaves oblong or ovate-oblong, mostly obtuse; staminate flowers unknown. 1. *P. canadensis.*
Leaves linear or oblong, acute; hermaphrodite flowers unknown.
  Staminate spathe sessile.
    Leaves oblong or linear-oblong, 2–3 mm. wide; spathe of the staminate flowers 5–6 mm. long; anthers 2–2.5 mm. long. 2. *P. Nuttallii.*
    Leaves linear, 1.5 mm. wide or less (rarely 2 mm. wide); staminate spathe 2–3 mm. long; anthers about 1 mm. long.
      Leaves 1–2 cm. long; sepals and petals 1.5–2 mm. long. 3. *P. angustifolia.*
      Leaves 5–8 mm. long; sepals and petals 1–1.5 mm. long. 4. *P. minor.*
  Staminate spathe peduncled.
    Staminate spathe ovoid, abruptly contracted at the base; sepals 2.5 mm. long; petals present. 5. *P. linearis.*
    Staminate spathe obovoid, tapering at the base; sepals of the staminate flowers 5 mm. long; petals wanting. 6. *P. Planchonii.*

1. **Philotria canadensis** (Michx.) Britton, Science II. 2: 5. 1895.

Elodea canadensis Michx. Fl. Bor. Am. 1: 20. 1803.
Anacharis Alsinastrum Bab. Ann. Mag. Nat. Hist. II. 1: 83. 1848.
?*Anacharis canadensis* Planch. Ann. Mag. Nat. Hist. II. 1: 86. 1848.
Elodea latifolia Casp. Jahrb. Wiss. Bot. 1: 467. 1858.

Stem slender, 3–10 dm. long, usually with short internodes; leaves verticillate in 3's or 4's, or the lower ones in 2's, sessile; blades oblong or ovate-oblong, usually obtuse, 5–10

mm. long, 2–4 mm. wide, minutely serrulate; staminate flowers unknown; flowers in the typical American form usually hermaphrodite, in the European (*Anacharis Alsinastrum*), pistillate; sheath tubular, 1–1.5 cm. long; tube of the hypanthium 5–10 mm. long; sepals and petals elliptic, obtuse, about 1.5 mm. long; stamens usually 3, rarely 4–6, or reduced to mere filaments; anthers oblong, nearly sessile; stigmas 3, spreading, purplish, emarginate, about equaling the petals and sepals.

TYPE LOCALITY: Rivers of Canada.
DISTRIBUTION: Slow streams and ponds, from Quebec to Virginia and Minnesota; also in Europe, but only introduced as the pistillate *A. Alsinastrum*.
ILLUSTRATIONS: (all of *A. Alsinastrum*) Ann. Sci. Nat. III. 11: *pl. 1;* Bot. Zeit. 16: *pl. 9;* Jahrb. Wiss. Bot. 1: *pl. 27, f. 40–47, pl. 28.*

2. **Philotria Nuttallii** (Planch.) Rydb. Bull. Torrey Club 35: 461. 1908.

Serpicula verticillata Muhl. Cat. 84. 1813. Not *S. verticillata* L. 1781.
Udora canadensis Nutt. Gen. 2: 242. 1818.
Udora verticillata Spreng. Syst. 1: 170, in part. 1825.
Anacharis Nuttallii Planch. Ann. Mag. Nat. Hist. II. 1: 86. 1848.

Dioecious water-plant; stem slender, 3–10 dm. long, the internodes often longer than the leaves; leaves usually in 3's or the lower ones in 2's, sessile, oblong or lance-oblong, acute, 5–10 mm. long, 2–3 mm. wide, finely serrulate; spathe of the staminate flowers ovoid, sessile, 5–6 mm. long; flower without a tube; sepals and petals oblong, the former scarcely exceeding the oblong anthers, which are 2–2.5 mm. long; sheath of the pistillate flowers about 1 cm. long, 2-cleft; tube of the hypanthium 5–15 cm. long; sepals and petals elliptic, 1.5 mm. long; filaments rudimentary; stigmas slightly exceeding the petals, 2-cleft at the apex.

TYPE LOCALITY: North America.
DISTRIBUTION: Slow streams and ponds, from New York to Virginia.
ILLUSTRATIONS: Torr. Fl. N. Y. *pl. 125;* Britt. & Brown, Ill. Fl. *f. 207;* E. & P. Nat. Pfl. 2[1]: *fig. 184, C* and *D* (all as *Elodea* or *Philotria canadensis*).

3. **Philotria angustifolia** (Muhl.) Britton; Rydb. Fl. Colo. 15. 1906.

Serpicula verticillata angustifolia Muhl. Cat. 84. 1813.
? *Serpicula occidentalis* Pursh, Fl. Am. Sept. 1: 33. 1814.
Serpicula canadensis Eat. Man. ed. 5. 390. 1829.
? *Apalanthe Schweinitzii* Planch. Ann. Mag. Nat. Hist. II. 1: 87. 1848.
? *Elodea Schweinitzii* Casp. Jahrb. Wiss. Bot. 1: 468. 1858.

Dioecious water-plant; stem slender, flaccid, 3–10 dm. long; leaves in 3's or 2's, sessile, linear, 1–2 cm. long, about 1 mm. wide, rarely 1.5 mm. wide, acute; spathe of the staminate flowers 2–3 mm. long, sessile, ovoid; sepals and petals elliptic or oval, the former about 2 mm. long, the latter smaller; anthers about 1 mm. long; spathe of the pistillate flowers tubular, 1–2 cm. long; hypanthium-tube 3–10 cm. long; sepals and petals elliptic, the former 1.5–2 mm. long; stigma 2-cleft.

TYPE LOCALITY: Pennsylvania.
DISTRIBUTION: Slow streams, from New York and Pennsylvania to Florida.

4. **Philotria minor** (Engelm.) Small, Fl. SE. U. S. 47. 1903.

Udora verticillata (?) *minor* Engelm.; Casp. Jahrb. Wiss. Bot. 1: 465, as synonym under *Anacharis Nuttallii*. 1858.

Dioecious water-plant; stems filiform, 3–5 dm. long; leaves in 3's or 2's, linear, 5–8 mm. long, 1 mm. broad or less, acutish; staminate spathe about 5 mm. long, ovoid, sessile; sepals and petals oval, 1–1.5 mm. long; anthers about 1 mm. long; pistillate spathe about 1 cm. long; hypanthium-tube 2–5 cm. long (rarely longer); petals and sepals elliptic, 1–1.5 mm. long; stigmas slender, longer than the sepals, deeply 2-cleft.

TYPE LOCALITY: St. Louis, Missouri.
DISTRIBUTION: Ponds, lakes, and slow streams, from Ohio and Kentucky to Wisconsin, Kansas, and Arkansas.
ILLUSTRATION: Jahrb. Wiss. Bot. 1: *pl. 29, f. 70–74.*

5. **Philotria linearis** Rydb. Bull. Torrey Club **35**: 464. 1908.

Dioecious water-plant; stem slender, 3–5 dm. long; leaves in 3's, linear, acute, about 1 cm. long, scarcely 1 mm. wide, apparently entire-margined; spathe of the staminate flowers peduncled; peduncle 3–4 mm. long; body ovate, about 3 mm. long; sepals broadly oval, 2.5 mm. long; petals oblong, shorter; stamens 9; anthers oblong, 2 mm. long.

TYPE LOCALITY: Swamp bordering Cumberland River, vicinity of Nashville, Tenn.
DISTRIBUTION: Known only from the type locality.

6. **Philotria Planchonii** (Casp.) Rydb. Bull. Torrey Club **35**: 462. 1908.

Anacharis canadensis Planch. Ann. Mag. Nat. Hist. II. 1: 86, mainly. 1848.
Elodea Planchonii Casp. Jahrb. Wiss. Bot. 1: 468. 1858.

Dioecious water-plant; stem slender, 1–10 cm. long; leaves in 3's or the lower opposite, sessile, oblong to linear, 7–15 mm. long, 1–2 mm. wide, acutish; spathe of the staminate flowers obovoid-clavate, nearly 1 cm. long, on a peduncle, 5–10 mm. long; staminate flowers short-pedicelled; sepals elliptic, 5 mm. long; petals lacking; stamens 9; anthers oblong, 3–4 mm. long, subsessile; spathe of the pistillate flowers linear or lance-linear, sessile, 2-cleft at the apex; tube of the hypanthium slender, 3–5 cm. long; sepals and petals linear, about 3 mm. long; stigmas 3, linear; stamens none.

TYPE LOCALITY: Saskatchewan.
DISTRIBUTION: Lakes and ponds, from Saskatchewan to Colorado and Nevada.

Family 2. HYDROCHARITACEAE

By Per Axel Rydberg

Aquatic or mud-inhabiting herbs, monoecious or dioecious, usually with rootstocks or stolons. Leaves clustered on the short crown. Flowers enclosed in spathes of distinct or united bracts. Hypanthium well developed, at least in the pistillate flowers. Perianth regular or nearly so. Petals and sepals each 3. Stamens 6–12. Filaments distinct or partly united. Gynoecium of 6–15 united pistils. Ovary inferior, usually 6–15-celled. Styles or stigmas as many as the cells of the ovary. Ovules numerous. Fruit usually indehiscent, somewhat fleshy.

Marine plants with distichous leaves which are sessile and linear; anthers 4-celled. 1. Thalassia.

Fresh-water plants with spirally arranged clustered leaves, which are distinctly petioled, with ovate, orbicular, or reniform blades; anthers 2-celled.
- Filaments distinct; ovary 1-celled; petals in the pistillate flowers wanting or rudimentary. 2. Hydromystia.
- Filaments monadelphous; ovary 6–9-celled; petals in the pistillate flowers present. 3. Limnobium.

1. THALASSIA Solander; Konig, Ann. Bot. K. & S. 2: 96. 1805.

Marine dioecious herbs with creeping rootstocks. Leaves several, clustered at the nodes, sheathing at the base, linear, elongate. Scapes arising from the clusters of the leaves; spathes tubular, 2-cleft. Staminate flowers pedicelled. Perianth of 3 petaloid sepals. Stamens 9; filaments very short or obsolete, distinct; anthers opening laterally. Pistillate flower nearly sessile in the spathe; ovary 6–12-celled. Fruit stalked, mammillate or echinate, opening by valves. Seeds numerous.

Type species, *Thalassia testudinum* Konig.

1. Thalassia testudinum Konig, Ann. Bot. K. & S. 2: 96. 1805.

Thalassia vitrariorum Pers. Syn. Pl. 2: 563. 1807.

Base of the short stem covered by the remains of old leaves; leaf-blades linear-strap-shaped, 1–3 dm. long, 7–10 mm. wide, glabrous, obtuse, rounded at the apex, withering-persistent; spathe 2-cleft, its lobes elliptic, papillose-dentate on the margins; perianth-lobes in both kinds of flowers oblong, rounded above, 10–12 mm. long; anthers 8 mm. long, linear; stigmas 9–12, linear-filiform, pilose, grooved on the inside, about 1 cm. long; fruit (young) elliptic-fusiform, short-stalked and short-beaked, densely mammillate.

Type locality: Sea near the shores of Antigua [West Indies].
Distribution: Coasts of Peninsular Florida, Bermuda, Bahamas, Antilles, and Venezuela.

2. HYDROMYSTIA G. Meyer, Fl. Esseq. 152. 1818.

Trianea Karst. Linnaea 28: 424. 1856.

Stoloniferous dioecious or monoecious water-plants. Leaves basal, petioled, clustered; blades ovate or ovate-orbicular, tapering into the petiole, somewhat spongy beneath. Flowers solitary or the staminate ones 2 or 3, enclosed in a 2-cleft spathe. Sepals 3, lanceolate. Petals 3, in the staminate flowers linear, nearly filiform, longer than the sepals, in the pistillate flowers wanting or rudimentary. Stamens 6–12, distinct; anthers linear. Gynoecium of about 6 united pistils; ovary one-celled with 6 placentae; styles 6, subulate; stigmas curved. Fruit ellipsoid, one-celled, many-seeded.

Type species, *Hydromystia stolonifera* G. Meyer.

1. **Hydromystia stolonifera** G. Meyer, Fl. Esseq. 153. 1818.

Limnobium stoloniferum Griseb. Fl. Brit. W. Ind. 506. 1861.

Petioles 5–20 cm. long, triquetrous, thick below, tapering upwards; leaf-blades fleshy, ovate to suborbicular, 2–8 cm. long, entire, veined beneath; scapes 2–5 cm. long; sepals in the staminate flowers lanceolate, spreading; petals linear-filiform, spreading, about half longer than the sepals; filaments subulate, shorter than the anthers; styles according to Meyer 3, as long as the stamens; hypanthium in the pistillate flowers tubular; sepals lanceolate; petals according to Meyer 3 rudimentary scales, according to Ascherson and Gürke wanting; styles subulate, pilose.

TYPE LOCALITY: Stagnant water, Hamburg plantation, Essequibo [British Guiana].
DISTRIBUTION: Porto Rico and Lesser Antilles; also in Guiana and Venezuela.

3. **LIMNOBIUM** Rich. Mém. Inst. Paris 2: 32. 1811.

Usually floating aquatics with pendant roots and stolons, dioecious or monoecious. Leaves basal, clustered, petioled; blades rounded heart-shaped, spongy-reticulate beneath. Staminate spathe peduncled, 1-leaved, producing 3 long-pedicelled flowers. Sepals 3, oblong. Petals 3, linear. Stamens 6–12, monadelphous; anthers linear, unequal in height. Pistillate spathe 2-leaved, with a single short-pedicelled flower. Petals and sepals as in the staminate flowers. Stamens represented by 3–6 awl-shaped rudiments. Ovary inferior, 6–9-celled, with as many placentae in the axis. Stigmas as many as the cells, 2-parted, Fruit an ovoid, 6–9-celled, many-seeded berry.

Type species, *Limnobium Bosci* Rich., which is the same as *L. Spongia*.

1. **Limnobium Spongia** (Bosc) Rich.; Steud. Nom. Bot. ed. 2. 45. 1841.

Hydrocharis Spongia Bosc, Ann. Mus. Paris 9: 396. 1807.
Limnobium Bosci Rich. Mém. Inst. Paris 2: 32. 1811.
Hydrocharis cordifolia Nutt. Gen. 2: 241. 1818.

Petioles erect or ascending, 5–2.5 cm. long; leaf-blades ovate to suborbicular or the earlier reniform, 2–5 cm. broad, obtuse at the apex, truncate or cordate at the base, entire, purplish beneath, becoming somewhat spongy in winter; staminate scapes 7–10 cm. long, filiform; spathe lance-ovoid, 3–5 cm. long; pistillate scapes about 2.5 cm. long, stout, recurved in fruit; sepals 7–10 mm. long, oblong; petals linear, 8–10 mm. long; anthers linear, about 4 mm. long; stigmas filiform, 10–15 mm. long, papillose-ciliate; berry oval, 1–1.5 cm. long.

TYPE LOCALITY: South Carolina.
DISTRIBUTION: Shallow water, from New Jersey and Ontario to Florida, Texas, Missouri, and Illinois.
ILLUSTRATIONS: Mém. Inst. Paris 2: *pl. 8;* Ann. Mus. Paris 9: *pl. 30;* Britt. & Brown, Ill. Fl. *f. 209*.

Order **POALES**

By John Kunkel Small

Annual or perennial, caulescent or acaulescent plants, mostly herbs, but sometimes shrubs or trees, commonly known as grasses or sedges. Stems or scapes (culms) simple or branched, often conspicuously jointed, the internodes hollow or solid, more or less sheathed by the leaf-bases. Leaves alternate, the basal portion sheathing the stem or scape, with free or united margins, commonly bearing a glabrous or pubescent ring on the inner side at the top; blades usually narrow and elongate, entire or nearly so, but usually rough-margined. Inflorescence spicate, racemose or paniculate, the ultimate spikelets usually with 2-ranked or spiral closely imbricate bracts (scales, glumes). Flowers perfect, or rarely monoecious or dioecious, inconspicuous, incomplete, or with a perianth of scales and bristles. Androecium of 1–6, usually 3 stamens; filaments slender; anthers 2-celled, versatile or adnate. Gynoecium of 2 or 3 united carpels, or rarely 1-carpellary. Ovary 1-celled, 1-ovuled. Styles 2 or 3 and distinct or united, or sometimes single; stigmas slender or plumose. Fruit a caryopsis (grain) or an achene which is either naked or enclosed in an accrescent second bract (perigynium) thus forming a utricle-like structure, or rarely baccate.

Leaves 2-ranked, their sheaths with generally ununited margins; stems terete and mostly hollow; fruit a grain (caryopsis) or rarely baccate. Fam. 1. Poaceae.

Leaves 3-ranked, their sheaths with united margins; stems solid; fruit an achene. Fam. 2. Cyperaceae.

Family 1. POACEAE

By George Valentine Nash

Annual or perennial, sometimes monoecious or dioecious, herbs, or rarely shrubs or trees. Stems (culms) generally hollow, occasionally solid, the nodes closed. Leaves sheathing the stem, the sheaths usually split to the base on the side opposite to the blade, rarely closed; a scarious or cartilaginous, sometimes herbaceous, naked or hairy ring, called the ligule, is borne at the orifice of the sheath, rarely wanting. Inflorescence spicate, racemose, or paniculate, consisting of spikelets composed of 2–many 2-ranked, very rarely spiral, imbricate bracts, called scales (glumes), the lower 1–4, usually 2, empty, or these rarely wanting. The remaining scales, excepting sometimes the terminal ones, contain in the axil a flower which is usually enclosed in a bract-like awnless organ called the palet, placed opposite to the scale and with its back toward the axis (rachilla) of the spikelet, generally 2-, rarely 1-nerved; palet sometimes present without the flower, and vice versa. Flowers perfect, pistillate, or staminate, subtended by 1–3 hyaline, usually minute, scales, called lodicules. Stamens 1–6, usually 3, rarely numerous. Anthers versatile, 2-celled. Ovary 1-celled, 1-ovuled. Styles 1–3, commonly 2 and lateral, rarely 1. Stigmas hairy or plumose. Fruit a seed-like grain, the caryopsis, or sometimes a nut or berry in some of the Bambuseae. Endosperm starchy.

A. Spikelets articulated below the empty scales (also in a few genera in B), or below a subtending involucre, deciduous alone, in groups, or with the surrounding involucre, or persistent and falling with the internodes of a readily disarticulating rachis; 1- or 2-flowered, if 2-flowered the first or lower flower staminate, very rarely perfect, the upper flower perfect; rachilla not extending beyond the scales and its internodes not measurable.

Spikelets arranged in spikes, racemes, or spike-like racemes, these sometimes forming panicles, the axis articulate, rarely continuous; empty scales firmer than the rest, the first scale the largest and enclosing the others, the fruiting scales and palets hyaline, delicate.

Spikelets unisexual, arranged in different parts of the same or in different inflorescences. — Tribe 1. Maydeae.

Spikelets in pairs (rarely single or in 3's), one sessile, the other pedicellate (rarely both pedicellate), all perfect, or the pedicellate staminate, empty, or sometimes wanting. — Tribe 2. Andropogoneae.

Spikelets paniculate, or if in racemes or spikes the axis continuous; empty scales not firmer than the rest, the first scale smaller than the others, the fruiting scales and palets rarely hyaline.

Spikelets round or dorsally compressed (laterally compressed in *Arthropogon* and *Lithachne*); hilum punctiform.

Fruiting scales and palets membranous, resembling the other scales in texture.

Spikelets arranged in a single spike or raceme, deciduous singly or in groups. — Tribe 3. Zoysieae.

Spikelets arranged in panicled racemes. — Tribe 4. Tristegineae.

Fruiting scales and palets chartaceous, coriaceous, or cartilaginous, differing in color, texture, and appearance from, and usually firmer than, the other scales. — Tribe 5. Paniceae.

Spikelets laterally compressed; hilum linear. — Tribe 6. Oryzeae.

B. Spikelets not articulated below the empty scales (rarely so in a few genera of the Agrostideae, Aveneae, and Chlorideae), but above them or between the flowering scales, hence the empty scales persistent after the fall of the remainder of the spikelet; 1–many-flowered, the lower flower perfect, very rarely staminate, the upper ones imperfect or wanting; rachilla often extending beyond the scales, its internodes usually measurable.

Stems herbaceous, annual; leaf-blades usually sessile and not articulated with the sheath, rarely petiolate and articulated.

Spikelets upon distinct though sometimes short pedicels, arranged in open or contracted panicles, or in racemes; if in spikes, these are secund and the axis continuous and not notched for the reception of the spikelets.
Spikelets not arranged in 2-rowed secund spikes.
Spikelets 1-flowered.
Empty scales 4, the palet 1-nerved. — Tribe 7. PHALARIDEAE.
Empty scales 2, or these sometimes wanting, the palet 2-nerved. — Tribe 8. AGROSTIDEAE.
Spikelets 2–many-flowered.
Flowering scales generally shorter than the empty ones, usually with a geniculate awn on the back or arising from between the teeth, rarely with a terminal awn or awnless. — Tribe 9. AVENEAE.
Flowering scales usually longer than the empty ones, awnless, or with a straight terminal, very rarely dorsal, awn. — Tribe 11. FESTUCEAE.
Spikelets crowded in 2 close rows, forming 1-sided spikes or racemes with a continuous rachis. — Tribe 10. CHLORIDEAE.
Spikelets arranged in spikes, usually alternately in 2 opposite rows and equilateral, very rarely in 1 row and unilateral, the axis notched for the reception of the spikelets and sometimes articulate. — Tribe 12. HORDEAE.
Stems woody, at least below; leaf-blades usually petiolate and articulated to the sheath, finally deciduous. — Tribe 13. BAMBUSEAE.

Tribe 1. **MAYDEAE**. Tall monoecious grasses with pithy stems and broad flat leaf-blades. Spikelets unisexual, the staminate usually 2-, sometimes 1-flowered, arranged at the nodes commonly in pairs, one sessile, the other pedicellate, or rarely both sessile or pedicellate, sometimes in 3's, the pistillate generally 1-, sometimes 2-flowered, single at the rachis-nodes. Pistillate and staminate spikelets borne in separate inflorescences, the staminate in terminal panicles or racemes which have a continuous or tardily disarticulating rachis, the pistillate in fascicled spikes in the axils of the leaves, the rachis fragile and readily disarticulating, or the axes of the spikes sometimes grown together into a thick, spongy, cylindric, continuous, compound axis with the flowers borne in longitudinal rows; or the staminate and pistillate spikelets in different parts of the same inflorescence, the staminate occupying the upper part of it or of its divisions, the pistillate the lower. Grain of various shapes, not furrowed; embryo large; starch grains simple, polyhedral. Fruit compound, with the seeds naked, or rarely enclosed in large scales, arranged in several longitudinal rows; more frequently the grain is enclosed in a false fruit, consisting of the rachis internode and the attached parts, or of the indurated sheath of the subtending leaf.

Fruiting spikelets not enclosed in a hard ivory-like involucre.
Staminate and pistillate spikelets in separate inflorescences, the former arranged in racemes in terminal panicles, the latter in axillary spikes subtended and enclosed by large basal bracts.
Pistillate spikes separate, the rachis articulate. — 1. EUCHLAENA.
Pistillate spikes grown together into a thick spongy organ known as the cob. — 2. ZEA.
Staminate and pistillate spikelets in the same inflorescence, the former occupying the upper and the latter the lower part of the spikes. — 3. TRIPSACUM.
Fruiting spikelets enclosed in a hard ivory-like ovoid or spheric involucre, formed of the sheath of the subtending leaf. — 4. COIX.

1. **EUCHLAENA** Schrad. Ind. Sem. Hort. Goetting. 1832. — Linnaea 8: Litt. 25. 1833.

Reana Brign. Ind. Sem. Hort. Mutin. 1849. — Ann. Sci. Nat. III. **12**: 365. 1849.

Tall monoecious grasses, with usually long leaves, the staminate spikelets borne in racemes which are arranged in terminal corymbiform panicles, rarely single, the pistillate in fasciculate articulated spikes in the leaf-axils. Staminate spikelets in pairs, 2-flowered, unequally pedicellate; scales 4, the outer 2 larger, membranous, empty, the inner 2 hyaline and enclosing each a flower; stamens 3. Pistillate spikelets solitary, sessile, 1-flowered;

scales 4. the outermost one very broad, almost boat-shaped, enclosing the inner ones and the narrow rachis; second and third scales empty, the latter and the fourth scale, which encloses the flower, hyaline; style very long, filiform. Grain free, included between the stony scale and the rachis-internode.

Type species, *Euchlaena mexicana* Schrad.

1. **Euchlaena mexicana** Schrad. Ind. Sem. Hort. Goetting. 1832. — Linnaea 8: Litt. 25. 1833.

Reana Giovanninii Brign. Ind. Sem. Hort. Mutin. 1849. — Ann. Sci. Nat. III. **12**: 365. 1849.
Reana luxurians Durieu, Bull. Soc. Acclim. II. **9**: 581. 1872.
Euchlaena Bourgaei Fourn. Bull. Soc. Bot. Belg. **15**: 468. 1876.
Euchlaena Giovanninii Fourn. Bull. Soc. Bot. Belg. **15**: 468. 1876.
Euchlaena luxurians Durieu & Asch. Bull. Soc. Linn. Paris **1**: 107. 1877.

A variable grass, perhaps representing more than one species. Stems up to 5 m. tall, slender or stout; leaf-blades up to 1 m. long and 8 cm. wide, usually elongate, lanceolate, acuminate; staminate racemes up to 1.5 dm. long, the spikelets about 8 mm. long; pistillate spikelets concealed in the leaf-sheaths, the internodes with oblique ends, hence when short appearing triangular.

TYPE LOCALITY: Mexico.
DISTRIBUTION: Mexico and Guatemala, and extensively cultivated in warm and tropical regions.
ILLUSTRATIONS: Bot. Mag. *pl. 6414;* Bull. U. S. Dep. Agr. Agrost. **20**: *f. 1;* Vasey, Agr. Grasses U. S. ed. 2. *pl. 22;* Bull. U. S. Dep. Agr. Agrost. **15**: *f. 12;* Beal, Grasses N. Am. **2**: *f. 1;* Bull. Tenn. Exp. Sta. **5**: *f. 32–34.*

2. **ZEA** L. Sp. Pl. 971. 1753.

Mays (Tourn.) Gaertn. Fruct. **1**: 6. 1788.

Tall monoecious grasses with broad ample leaf-blades, the staminate spikelets borne in terminal panicles, the pistillate sessile in many rows on a spongy thick rachis in the axils of the leaves: Staminate spikelets in pairs, 2-flowered, unequally pedicellate or nearly sessile; scales 4, the outer 2 larger, membranous, the inner 2 hyaline and bearing flowers; stamens 3. Pistillate spikelets closely sessile, densely crowded in longitudinal rows upon a thick spongy unarticulated rachis, the entire inflorescence completely enclosed in large herbaceous sheathing bracts; scales 4, membranous, usually hyaline, commonly short and broad, rarely large, the fourth bearing a flower; styles very long, filiform, shortly 2-toothed at the apex. Grain naked, excepting at the base, or rarely enclosed in the enlarged scales.

Type species, *Zea Mays* L.

1. **Zea Mays** L. Sp. Pl. 971. 1753.

Mays Zea Gaertn. Fruct. **1**: 6. 1788.
? *Zea canina* S. Wats. Proc. Am. Acad. **26**: 160. 1891.

Stems up to 3 m. tall; leaf-blades up to 1 m. long and 1 dm. wide, usually recurved and drooping at the apex; staminate inflorescence up to 2 dm. long or more, its branches spreading and drooping; pistillate inflorescence varying much in form and size, the grains or kernels also variable in form and color.

TYPE LOCALITY: America.
DISTRIBUTION: Widely cultivated in tropical and warm temperate regions all over the world, and often escaping from cultivation.
ILLUSTRATIONS: Schkuhr, Handb. *pl. 283;* Burger, Abhandl. Mais *pl. 1–4;* T. Nees, Pl. Off. Suppl. **4**: *pl. 1, 2;* E. Duchesne, Traité Mais *pl. 1–3;* Bonafous, Hist. Mais *pl. 1–12;* Dict. Sci. Nat. Monocot. *pl. 23, 24;* Descourt. Fl. Ant. *pl. 544;* Lam. Tab. Encyc. *pl. 749;* Ann. Mus. Paris **17**: *pl. 6;* Bull. U. S. Dep. Agr. Agrost. **20**: *f. 2;* Beal, Grasses N. Am. **2**: *f. 2;* Bull. Tenn. Exp. Sta. **5**: *f. 35.*

3. **TRIPSACUM** L. Syst. Nat. ed. 10. 1261. 1759.

Digitaria Heist.; Adans. Fam. Pl. **2**: 550. 1763.

Tall perennial grasses, with stout rootstocks, usually broad flat leaf-blades, and the spikelets in spikes or the upper portion racemose. Rachis articulated, the lower portion bearing pistillate, the upper staminate, spikelets. Pistillate spikelets 1-flowered, in excavations in the rachis, the outer scales very hard, thick and shining, concealing the more deli-

cate remaining scales; fourth scale enclosing the flower; style slender; stigmas 2, exserted. Grain enclosed in the appressed outer scale and the internode. Staminate spikelets 2-flowered, in pairs at the nodes, sessile or pedicellate; scales 4, the outer 2 empty, coriaceous and shining, or membranous, the 2 inner thinner, each enclosing a flower; stamens 3.

Type species, *Tripsacum dactyloides* L.

Staminate spikelets both sessile, or one with a very short pedicel, the outer scales coriaceous; spikes single, or sometimes 2–4, usually digitate.
- Leaf-blades less than 3 cm. wide, rarely pubescent on the upper surface; staminate spikelets 5 mm. long or more.
  - Leaf-blades 1.5–2.5 cm. wide, flat; stems stout, exceeding 1 m. in height. 1. *T. dactyloides.*
  - Leaf-blades usually under 5 mm. wide, often involute; stems slender, under 1 m. tall. 2. *T. floridanum.*
- Leaf-blades 4–5 cm. wide, pubescent on the upper surface; staminate spikelets 3–4 mm. long. 3. *T. latifolium.*

Staminate spikelets, 1 or sometimes both, on long pedicels, the outer scales membranous.
- Leaf-sheaths hispid. 4. *T. pilosum.*
- Leaf-sheaths glabrous, or nearly so.
  - Blades 3 cm. wide or more, glabrous. 5. *T. laxum.*
  - Blades 2 cm. wide or less, pubescent on the upper surface.
    - Stems stout; blades 1–2 cm. wide. 6. *T. acutiflorum.*
    - Stems slender; blades 5–10 mm. wide, sometimes involute. 7. *T. Lemmoni.*

1. **Tripsacum dactyloides** L. Syst. Nat. ed. 10. 1261. 1759.

Coix dactyloides L. Sp. Pl. 972. 1753.
Tripsacum monostachyum Willd. Hort. Berol. 1: 1. 1803.
Tripsacum dactyloides monostachyon Wood, Class Book 453. 1845.
Tripsacum compressum Fourn. Bull. Soc. Bot. Belg. 15: 466. 1876. Not *T. compressum* Rasp. 1825.
Tripsacum dactyloides hispidum Hitchc. Bot. Gaz. 41: 295. 1906.

Stems glabrous, or sometimes pubescent below the inflorescence, up to 2.5 m. tall, from stout horizontal rootstocks; leaf-sheaths glabrous, or hirsute at the apex; blades up to 6 dm. long, usually 1–2 cm. wide, rarely broader, long-acuminate, narrowed at the base, glabrous, or sometimes hirsute or hispid on the upper surface; spikes usually single on the branches, often 2–4 at the summit of the stem, 1–3 dm. long, the lower one quarter to one half pistillate; pistillate spikelets 7–10 mm. long, the first or outer scale broadly ovate, acute; staminate spikelets 7–11 mm. long, the outer 2 scales oblong, from rounded to acute at the apex, glabrous or pubescent.

TYPE LOCALITY: America.
DISTRIBUTION: Rhode Island to Nebraska, south to Florida, Texas, and Mexico; southern Bahamas; Haïti; also in South America.
ILLUSTRATIONS: Lam. Tab. Encyc. *pl. 750;* Britt. & Brown, Ill. Fl. *f. 210;* A. Gray, Man. *pl. 14;* Mart. Fl. Bras. *pl. 73;* Bull. U. S. Dep. Agr. Agrost. **7**: *f. 1;* **20**: *f. 3;* **14**: *f. 88;* **3**: *f. 87;* Vasey, Agr. Grasses U. S. *pl. 21;* Beal, Grasses N. Am. **2**: *f. 3;* Bull. Tenn. Exp. Sta. **7**: *pl. 1, f. 1;* Willd. Hort. Berol. *pl. 1.*

2. **Tripsacum floridanum** Porter; Vasey, Contr. U. S. Nat. Herb. **3**: 6. 1892.

Tripsacum dactyloides floridanum Beal, Grasses N. Am. **2**: 19. 1896.

Smooth and glabrous. Stems up to 1 m. tall, slender, from stout horizontal rootstocks; leaf-blades up to 4 dm. long, usually under 5 mm. wide, rarely broader, long-acuminate, narrowed toward the base; spikes on the branches and at the summit of the stem single, 8–20 cm. long, slender, the lower one quarter or less pistillate; pistillate spikelets 6–7 mm. long, the outer scale acute to acuminate; staminate spikelets 5–6 mm. long, the outer 2 scales glabrous or pubescent, oblong, obtuse to acutish.

TYPE LOCALITY: Miami, Florida.
DISTRIBUTION: Southern Florida.

3. **Tripsacum latifolium** Hitchc. Bot. Gaz. **41**: 294. 1906.

Stems stout, up to 2–3 m. tall, from stout horizontal rootstocks; leaf-sheaths glabrous, or pubescent at the apex; blades up to 7 dm. long and 4.5 cm. wide, long-acuminate, flat, the upper surface pubescent; spikes on the branches usually single, 1–3 at the summit of the stem, 1–3 dm. long and more slender than in *T. dactyloides*, with the pistillate portion

2–3 mm. in diameter; staminate spikelets 3–4 mm. long, the outer scales oblong, rounded at the apex.

TYPE LOCALITY: Cubilquitz, Department Alta Verapaz, Guatemala.
DISTRIBUTION: Guatemala and Honduras.

4. **Tripsacum pilosum** Scrib. & Merr. Bull. U. S. Dep. Agr. Agrost. **24**: 6. 1900.

Stems stout, 1–2 m. tall, glabrous, or pubescent just below the inflorescence; leaf-sheaths densely papillose-hispid; blades 4–6 dm. long, 2–4 cm. wide, long-acuminate, narrowed toward the base, hirsute, at least on the upper surface; spikes up to 2.5 dm. long, pistillate for about one quarter of their length or less, rather slender; pistillate spikelets about 5 mm. long, the outer scale ovate, acute; staminate spikelets 5–7 mm. long, the outer scale oblong, acute or obtuse.

TYPE LOCALITY: Between Colottan and Bolanos, Jalisco, Mexico.
DISTRIBUTION: Mexico.
ILLUSTRATION: Bull. U. S. Dep. Agr. Agrost. 24: *f. 1.*

5. **Tripsacum laxum** Nash.

Tripsacum fasciculatum Trin.; Aschers. Bot. Zeit. 35: 525. 1877. Not *T. fasciculatum* Rasp. 1825.

Stems 1–2 m. tall, glabrous; leaf-sheaths glabrous; blades up to 8 dm. long and 7 cm. wide, glabrous, long-acuminate; spikes usually numerous, sometimes few, flexuous, slender, up to 2 dm. long; pistillate spikelets about 5 mm. long, the outer scale ovate; staminate spikelets 4–6 mm. long, one sessile or rarely on a short pedicel, the other on a slender pedicel 3–4 mm. long.

TYPE LOCALITY: Hacienda de la Laguna, Mexico.
DISTRIBUTION: Southern Mexico.

6. **Tripsacum acutiflorum** Fourn. Bull. Soc. Bot. Belg. **15**: 466. 1876.

Tripsacum lanceolatum Rupr.; Fourn. Mex. Pl. Gram. 68. 1881.

Stems up to 1 m. tall, glabrous; leaf-sheaths glabrous or sometimes ciliate on the margin; blades up to 5 dm. long, 1–2 cm. wide, long-acuminate, narrowed toward the base, pubescent on the upper surface; spikes up to 2 dm. long, slender, the pistillate portion occupying about one half the length and 3–4 mm. in diameter; pistillate spikelets 4–5 mm. long, the outer scale ovate, acute; staminate spikelets 6–7 mm. long, one sessile, the other with a pedicel about 1 mm. long, the outer scales oblong-lanceolate, obtuse, glabrous.

TYPE LOCALITY: Mexico.
DISTRIBUTION: Lower California and Sonora to Durango and Oaxaca.

7. **Tripsacum Lemmoni** Vasey, Contr. U. S. Nat. Herb. **3**: 6. 1892.

Tripsacum dactyloides Lemmoni Beal, Grasses N. Am. **2**: 19. 1896.

Stems 1–2 m. tall, glabrous; leaf-sheaths glabrous, or the lowermost sometimes pubescent; blades up to 4.5 dm. long and 5–10 mm. wide, glabrous; spikes up to 1 dm. long, slender, the pistillate portion about one half the length and 4 mm. in diameter; pistillate spikelets 5–6 mm. long, the outer scale ovate; staminate spikelets 6 mm. long, the outer scales oblong-lanceolate, hispidulous.

TYPE LOCALITY: Huachuca Mountains, Arizona.
DISTRIBUTION: Arizona and Mexico.

4. **COIX** L. Sp. Pl. 972. 1753.

Tall branching monoecious grasses, with flat leaf-blades, and simple or fasciculate spikes. Spikelets unisexual. Pistillate spikelets borne in short spikes, consisting of 1 fertile spikelet and 1 or 2 sterile ones, which are included in a globose or oblong finally stony involucre; scales 4, thin, hyaline, the 2 outer empty, the 2 inner bearing flowers or the fourth one empty; styles free almost to the base, very long, filiform. Staminate spikelets 1- or 2-flowered, in 2's or 3's at the nodes of the rachis of spikes which are exserted from

the involucre; scales 4, the 2 outer empty, the 2 inner ones hyaline, both bearing flowers or the third sometimes empty; stamens 3.

Type species, *Coix Lachryma-Jobi* L.

1. **Coix Lachryma-Jobi** L. Sp. Pl. 972. 1753.

Stems 1 m. or more tall, branching; leaf-blades broad and flat, up to 7 dm. long and 4 cm. wide; inflorescences mostly from the axils of the leaves, fasciculate, the involucres white or bluish-white, globular or broadly ovoid, 6–12 mm. long.

TYPE LOCALITY: India.
DISTRIBUTION: Throughout tropical regions.
ILLUSTRATIONS: Rheede, Hort. Mal. **12**: *pl. 70*; Rumph. Amb. **5**: *pl. 75, f. 2*; Bot. Mag. *pl. 2479*; Lam. Tab. Encyc. *pl. 750*; Schkuhr, Handb. *pl. 285*; Webb & Berth. Hist. Nat. Canar. *pl. 242, 243*; Miq. Fl. Ind. Bat. *pl. 41*; Bull. U. S. Dep. Agr. Agrost. **20**: *f. 4*; Beal, Grasses N. Am. **2**: *f. 4*.

Tribe 2. **ANDROPOGONEAE.** Low prostrate or creeping, or tall and stout, annual or perennial grasses, varying much in habit and foliage. Inflorescence of 1 or more so-called sub-compound racemes in which the axis or rachis is articulate, rarely continuous, at each node a primary branch arising which is the so-called pedicel, and here thus designated, of the primary or pedicellate spikelet; these sub-compound racemes (referred to in the descriptions below as racemes when the primary branch is free, or as spikes when it is grown to the internodes of the rachis) arranged singly, in pairs, digitately, or in panicles which are sometimes decompound. Spikelets 1-, or rarely 2-flowered, if the latter the lower flower staminate, the upper perfect, arranged at each rachis-node, excepting the terminal, in pairs, one at the apex of a short primary branch known as the pedicel, the other sessile, very rarely single or in 3's, the terminal group consisting of 3 spikelets, 1 sessile, the others on short primary branches, the latter, whether single or in pairs, often reduced in size and number of scales, sometimes entirely wanting; rarely both spikelets are on primary branches, and so said to be pedicellate. Scales of the spikelet normally 4, sometimes 3, or in the pedicellate spikelets often reduced to 1, the 2 outer scales rigid, at length more or less indurated, always firmer than the remaining scales, the fourth scale sometimes awnless, or more commonly bearing an awn, this either perfect, *i. e.*, with a spiral column at the base and geniculate above where it passes into the contorted or straight terminal portion called the subula, or imperfect, *i. e.*, without the spiral column. Grain free, but enclosed in the outer more or less indurated scales: embryo large; starch grains simple, large, subglobose or obtusely polyhedral. Fruiting spikelets usually persistent and deciduous with the internodes of a readily disarticulating rachis, rarely deciduous alone.

Internodes of the rachis of the racemes or spikes thickened, appressed or grown to the pedicels of the primary spikelets, thus forming excavations for the reception of the secondary or sessile spikelets; fertile flowering scales always awnless.
- First empty scale of the sessile spikelet flat or merely convex, not pitted.
  - Racemes or spikes cylindric, fragile, readily disarticulating, the separated internodes with the apex pitted or deeply excavated.
    - Pedicels grown to the rachis-internodes; spikes narrowed above into a long slender tail, consisting of imperfect spikelets; annual grasses. 5. STEGOSIA.
    - Pedicels free from the rachis-internodes; upper part of spikes like the lower; perennial grasses. 6. COELORACHIS.
  - Racemes or spikes compressed, the rachis tardily disarticulating, the apex of the separated internodes flat and not furnished with a pit or excavation. 7. HEMARTHRIA.
- First empty scale of the sessile spikelet globose, pitted. 8. HACKELOCHLOA.

Internodes of the rachis not thickened, and without excavations for the reception of the spikelets.

- Spikelets homogamous, or rarely the pedicellate one pistillate; fertile flowering scales usually awned, sometimes awnless.
  - Rachis of the racemes continuous.
    - Racemes in a narrow spike-like panicle; spikelets awnless. — 9. IMPERATA.
    - Racemes in an open usually flabellate panicle; spikelets awned. — 10. MISCANTHUS.
  - Rachis of the racemes articulate.
    - Spikelets in pairs at each node of the rachis.
      - Spikelets 1-flowered; racemes in a panicle, the axis elongate.
        - Spikelets awnless.
          - Pedicellate spikelet perfect; panicle loose and open, the pubescence white. — 11. SACCHARUM.
          - Pedicellate spikelet pistillate; panicle dense and spike-like, the pubescence golden-brown. — 12. ERIOCHRYSIS.
        - Spikelets awned. — 13. ERIANTHUS.
      - Spikelets 2-flowered; racemes 2–many, digitate or approximate on a short axis. — 15. ISCHAEMUM.
    - Spikelets in 3's at each node of the rachis. — 14. POLYTRIAS.
- Spikelets heterogamous, the sessile perfect, the pedicellate staminate, empty, or wanting; if both spikelets are pedicellate, the one with the shorter pedicel is staminate, the one with the longer pedicel perfect.
  - Spikelets 2-flowered.
    - Pedicellate spikelets developed, bearing flowers. — 15. ISCHAEMUM.
    - Pedicellate spikelets rudimentary, or wanting, and the pedicel only present. — 16. EREMOCHLOA.
  - Spikelets 1-flowered.
    - Spikelets all pedicellate; axis of the racemes obscurely articulate. — 17. TRACHYPOGON.
    - Spikelets sessile and pedicellate; axis of the racemes evidently articulate.
      - First empty scale balsam-bearing; raceme single; spikelets awnless. — 18. ELYONURUS.
      - First empty scale not balsam-bearing; racemes when single with the sessile spikelets usually awned.
        - No false whorl of staminate or empty spikelets at the base of the racemes; several pairs of staminate or empty spikelets may be present, but never in whorls.
          - Fourth or fertile scale awned on the back, often near the base; leaf-blades cordate at the base. — 19. ARTHRAXON.
          - Fourth or fertile scale with the awn terminal or arising from between the teeth, or sometimes awnless; leaf-blades not cordate.
- Inflorescence simple or compound, made up of 1 or more racemes which are sessile or on very short peduncles.
  - Sessile spikelets not cylindric.
    - Spikelets strongly laterally compressed, the second scale long-awned; intercarinal space of the first scale of the sessile spikelet narrow. — 20. DIECTOMIS.
    - Spikelets dorsally compressed, the second scale awnless or nearly so; intercarinal space of the first scale of the sessile spikelet broad, flat or nearly so, or depressed.
      - Raceme single, the internodes of the rachis and the pedicels clavate, spongy, usually stout, when separated with a deep cup-shaped depression at the apex which has a scarious hyaline entire or toothed margin; pairs of spikelets all alike. — 21. SCHIZACHYRIUM.
      - Racemes not single, or very rarely so, the rachis internodes and pedicels filiform or flat and linear, not spongy, sometimes thickened at the apex, never clavate, not appendaged at the apex; lower pairs of spikelets in 1 or all of the racemes sometimes different from those above in sex, shape or awns.
        - Internodes of the rachis and pedicels filiform, sometimes stouter and convex on the back, not sulcate and furnished with a median hyaline line; racemes arranged in pairs, or digitately in 5's or less, sessile or only 1 pedunculate. — 22. ANDROPOGON.
        - Internodes of the rachis and pedicels flat, linear, the margins much thickened, the median portion hyaline or diaphanous; racemes usually numerous, subflabellate or on an elongated axis, all more or less pedunculate. — 23. AMPHILOPHIS.
- Sessile pistillate or perfect spikelets cylindric, markedly different from the pedicellate ones. — 24. HETEROPOGON.

Inflorescence decompound; or if compound, the racemes with a long naked base, the spikelets sometimes reduced to a group of 3 at the end.
Spikelets dorsally compressed; inflorescence decompound.
Pedicellate spikelets wanting. 25. SORGHASTRUM.
Pedicellate spikelets present. 26. HOLCUS.
Spikelets laterally compressed; inflorescence compound, the racemes with a long naked base.
Racemes of many internodes, numerous in whorls at the nodes of the panicle axis; spikelets awnless or with imperfect awns. 27. VETIVERIA.
Racemes of 1 internode, rarely of 2 internodes, in 2's–4's at the nodes of the panicle axis; spikelets with long perfect awns. 28. CHRYSOPOGON.
A false whorl of 4 or more staminate or empty spikelets at the base of each raceme. 29. THEMEDA.

5. **STEGOSIA** Lour. Fl. Cochinch. 51. 1790.

Tall annual grasses, with flat leaf-blades, and false spikes borne singly at the apex of the stem and its branches. Rachis of the spikes readily disarticulating, the separated internodes furnished with a pit or excavation at the summit, the pedicels grown to the rachis, the upper part of the spikes narrowed into a long tail, consisting of imperfect spikelets. Spikelets 1- or 2-flowered, in pairs, both appearing sessile from the attachment of the pedicel to the rachis. Sessile spikelet with the first scale coriaceous or cartilaginous, convex, with narrowly inflexed margins, closing the cavity in the rachis; second scale chartaceous or subcoriaceous, keeled; third scale hyaline, empty, or enclosing a palet and sometimes also a staminate flower; fourth scale hyaline, enclosing a perfect flower. Stamens 3. Styles short, not exserted.

Type species, *Stegosia cochinchinensis* Lour.

1. **Stegosia exaltata** (L.f.) Nash.

Rottboellia exaltata L.f. Suppl. 114. 1781.
Stegosia cochinchinensis Lour. Fl. Cochinch. 51. 1790.
Rottboellia setosa Presl, Reliq. Haenk. 1: 329. 1830.
Rottboellia arundinacea Hochst.; A. Rich. Tent. Fl. Abyss. 2: 444. 1851.
Rottboellia denudata Steud. Syn. Gram. 362. 1855.
Manisuris exaltata Kuntze, Rev. Gen. 779. 1891.

Stems up to 3 m. tall, branched; leaf-sheaths, at least the lower ones, papillose-hispid; blades linear-lanceolate, up to 6 dm. long and 3 cm. wide, the lower surface smooth, the upper rough and sometimes hairy; spikes up to 1.5 dm. long and 5 mm. in diameter; sessile spikelet 1- or 2-flowered, 5–7 mm. long, including the basal callus, the first scale oblong-elliptic, obtusely acute; pedicellate spikelet 1- or 2-flowered, or sometimes reduced to a single scale.

TYPE LOCALITY: Indies.
DISTRIBUTION: Introduced into Jamaica, Haïti, and Grenada to Trinidad. Widely spread in the tropics of the Old World.
ILLUSTRATION: Roxb. Pl. Corom. *pl. 157*.

6. **COELORACHIS** Brongn. in Duperrey, Voy. Coq. Bot. Phan. 64. 1831.

Lasiurus Boiss. Diagn. Pl. Orient. II. 4: 145. 1859.
Apogonia Fourn. Mex. Pl. Gram. 63. 1881.

Perennial, often tall, grasses, varying in habit, with flat or involute leaf-blades, and cylindric racemes which are borne singly at the apex of the stem or its branches. Rachis of the racemes readily disarticulating, the internodes, when separated, furnished with a pit or excavation at the apex, the pedicels free from the rachis. Spikelets 1- or 2-flowered, in pairs, the pedicellate similar in shape to the sessile or reduced to scales. First scale of the sessile spikelet coriaceous or cartilaginous, convex, with narrow inflexed margins, entirely closing the cavity in the rachis; second scale chartaceous or subcoriaceous, keeled; third scale hyaline or membranous, empty, or enclosing a palet and more rarely also a staminate flower; fourth scale hyaline, enclosing a perfect flower. Scales of the pedicellate spikelet

somewhat similar or reduced in size. Stamens 3. Styles short, not exserted.

Type species, *Coelorachis muricata* Brongn.

Leaf-sheaths round or nearly so, not keeled.
  Blades flat, 2–5 mm. wide, sometimes folded when dry, never semicylindric nor convolute. 1. *C. cylindrica.*
  Blades never flat, 2 mm. or less in diameter.
    First scale of the sessile spikelet smooth; midnerve of the leaf-blade very thick. 2. *C. impressa.*
    First scale of the sessile spikelet conspicuously marked with transverse undulate ridges. 3. *C. loricata.*
Leaf-sheaths compressed, keeled.
  Pedicels without an appendage.
    First scale of the sessile spikelet transversely wrinkled, rarely smooth.
      Wrinkles short, few, but little elevated, tubercle-like, sometimes entirely wanting. 4. *C. tuberculosa.*
      Wrinkles long, often extending completely across the scale, much elevated. 5. *C. rugosa.*
    First scale of the sessile spikelet pitted or tessellated. 6. *C. tessellata.*
  Pedicels with a prominent appendage on one side at the apex. 7. *C. ramosa.*

1. **Coelorachis cylindrica** (Michx.) Nash.

Tripsacum cylindricum Michx. Fl. Bor. Am. 1: 60. 1803.
Rottboellia campestris Nutt. Trans. Am. Phil. Soc. II. 5: 151. 1834.
Rottboellia cylindrica Torr. Pac. R. R. Rep. 4: 159. 1857. Not *R. cylindrica* Willd. 1797.
Manisuris cylindrica Kuntze, Rev. Gen. 779. 1891.

Stems from creeping rootstocks, round, 3–10 dm. tall, slender; leaf-sheaths round, narrow; blades 3 dm. long or less, 1–3 mm. wide; racemes finally exserted, 1–2 dm. long, straight or curved, the rachis barely if at all contracted at the nodes; sessile spikelet 4.5–5 mm. long, about equaling the internode, the first scale more or less pitted in longitudinal lines, or rarely unpitted, each pit often containing a subulate hair; pedicellate spikelet reduced to 1 or 2 short scales, the pedicel linear, shorter than the sessile spikelet and curved around its margin.

TYPE LOCALITY: Florida.
DISTRIBUTION: In sandy soil, at low elevations, Georgia and Florida to Texas, and along the rivers to Missouri and Oklahoma.
ILLUSTRATION: Bull. U. S. Dep. Agr. Agrost. **17**: *f. 307.*

2. **Coelorachis impressa** (Griseb.) Nash.

Rottboellia impressa Griseb. Cat. Pl. Cuba 235. 1866.
Manisuris impressa Kuntze, Rev. Gen. 780. 1891.

Stems tufted, branched, up to 1 m. tall, smooth and glabrous; leaf-sheaths round, smooth and glabrous, excepting on the ciliate margin near the apex; blades very narrow, confluent with the sheaths, up to 4 dm. long, 1–2 mm. wide, the upper portion occupied by the very thick whitish midnerve, the margins incurved, making the upper surface of the leaf concave, hispid-ciliate; racemes up to 12 cm. long, cylindric, less than 2 mm. in diameter; sessile spikelet, with the basal callus, 4 mm. long, the first scale linear-oblong, cartilaginous, very obtuse, with a few longitudinal furrows; pedicellate spikelet reduced to 2 or 3 scales, usually less than 1 mm. long, the pedicel linear, somewhat curved, shorter than the sessile spikelet.

TYPE LOCALITY: Western Cuba.
DISTRIBUTION: Known only from the type locality.

3. **Coelorachis loricata** (Trin.) Nash.

Rottboellia loricata Trin. Mém. Acad. St. Petersb. VI. **2**: 250. 1832.
Rottboellia filifolia Wright, in Sauv. Anal. Acad. Ci. Habana 8: 209. 1871.

Stems up to 1 m. tall, simple, smooth and glabrous; leaf-sheaths smooth and glabrous; blades smooth and glabrous, triangular, the angles rounded, sometimes rounded on the back, the upper surface grooved, strongly nerved, up to 2 dm. long, 1 mm. in diameter or less; racemes up to 2.5 dm. long, much exserted, about 1.5 mm. in diameter; sessile spikelet 4.5–5.5 mm. long, including the basal callus, oblong-elliptic, obtusely acute, the first scale transversely rugose on the back with irregular strongly elevated ridges, cartilaginous;

pedicellate spikelet nearly obsolete, on a linear curved pedicel equaling or nearly as long as the sessile spikelet.

TYPE LOCALITY: Brazil.
DISTRIBUTION: Cuba and Brazil.
ILLUSTRATION: Mart. Fl. Bras. 2^3: *pl. 71.*

4. **Coelorachis tuberculosa** Nash.

Manisuris tuberculosa Nash, Bull. N. Y. Bot. Gard. 1: 430. 1900.

Stems tufted, much compressed, 8–12 dm. tall; leaf-sheaths much flattened, broad, keeled; blades 3 dm. long or less, 3–7 mm. wide; racemes finally exserted, 6–10 cm. long, straight, the rachis barely if at all contracted at the nodes; sessile spikelet about 4 mm. long, about equaling the internode, the first scale transversely wrinkled, or very rarely without wrinkles, the wrinkles short, tubercle-like, irregularly disposed; pedicellate spikelet reduced to 1 or 2 short scales about one half the length of the linear pedicel, which is a little shorter than the sessile spikelet and curved around its margin.

TYPE LOCALITY: Eustis, Lake County, Florida.
DISTRIBUTION: Peninsular Florida.

5. **Coelorachis rugosa** (Nutt.) Nash.

Rottboellia rugosa Nutt. Gen. 1: 84. 1818.
Rottboellia corrugata Baldw. Am. Jour. Sci. 1: 355. 1819.
Rottboellia rugosa Chapmani Hack. in DC. Monog. Phan. 6: 308. 1889.
Manisuris rugosa Kuntze, Rev. Gen. 780. 1891.
Manisuris Chapmani Nash, in Small, Fl. SE. U. S. 56. 1903.

Stems tufted, much compressed, 6–15 dm. tall, stout; leaf-sheaths much flattened, broad, keeled; blades 4 dm. long or less, 10 mm. wide or less; racemes exserted or somewhat included at the base, sometimes spreading, 4–8 cm. long, straight or a little curved, the rachis-internodes often much contracted at the base, glabrous or puberulent; sessile spikelet 3.5–5 mm. long, about equaling or a little exceeding the internode, the first scale often 2-toothed at the obtuse apex, strongly transversely wrinkled, the wrinkles much elevated and often extending across the entire width of the scale, the longitudinal ridges usually rather prominent; pedicellate spikelet smaller, of 2 scales, empty, or sometimes bearing a staminate flower.

TYPE LOCALITY: Florida.
DISTRIBUTION: Southern New Jersey, Delaware, and Maryland to Florida and Texas.
ILLUSTRATIONS: Bull. U. S. Dep. Agr. Agrost. 17: *f. 306;* Britt. & Brown, Ill. Fl. *f. 215.*

6. **Coelorachis tessellata** (Steud.) Nash.

Rottboellia tessellata Steud. Syn. Gram. 362. 1855.
Rottboellia corrugata Chapm. Fl. S. U. S. 579. 1860. Not *R. corrugata* Baldw. 1819.
Manisuris tessellata Scribn. Bull. U. S. Dep. Agr. Agrost. 20: 20. 1900.

Stems tufted, much compressed, 8–12 dm. tall, stout; leaf-sheaths much flattened, broad, keeled; blades 4 dm. long or less, 3–8 mm. wide; racemes finally exserted, 6–12 cm. long, straight, the rachis barely if at all contracted at the nodes; sessile spikelet about 5 mm. long, a little exceeding the internode, the first scale deeply pitted, the pits quadrangular; pedicellate spikelet of 1 or 2 scales, about one half as long as the linear straight pedicel, which is shorter than the sessile spikelet.

TYPE LOCALITY: Louisiana.
DISTRIBUTION: Georgia and Florida to Louisiana.
ILLUSTRATIONS: Bull. U. S. Dep. Agr. Agrost. 17: *f. 305;* 20: *f. 9.*

7. **Coelorachis ramosa** (Fourn.) Nash.

Apogonia ramosa Fourn. Mex. Pl. Gram. 63. 1881.
Rottboellia aurita stigmosa Hack. in DC. Monog. Phan. 6: 311. 1889.

Stems up to 2 m. tall, branched above, smooth and glabrous; leaf-sheaths compressed, keeled, smooth and glabrous; blades flat, linear, up to 6 dm. long, less than 1 cm. wide, glabrous; racemes up to 1.5 dm. long, 2.5–3 mm. in diameter, included at the base or somewhat exserted; sessile spikelet about 4 mm. long, including the callus, the first scale elliptic, deeply emarginate at the apex, broadly winged from near the base, marked on the

back with about five longitudinal rows of broadly oblong pits; pedicellate spikelet a little smaller than the sessile one, perfect, the first scale without pits, the pedicel linear-clavate, winged on one side, the wing extending into a tooth equaling one half the width of the pedicel at its apex.

TYPE LOCALITY: Rio Blanco, Mexico.
DISTRIBUTION: Mexico and (according to Fournier) adjacent United States.

7. **HEMARTHRIA** R. Br. Prodr. 207. 1810.

Perennial, usually decumbent or ascending grasses, with extravaginal innovations, flat leaf-blades which are conduplicate in vernation, and compressed racemes or spikes borne singly at the apex of the stem and its branches. Rachis of the racemes or spikes tardily disarticulating, the apex of the separated internodes flat and not furnished with a pit or excavation, the pedicel usually grown to the rachis. Spikelets 1-flowered, dorsally compressed; first scale of the sessile spikelet coriaceous, flat on the back, with the margins very narrowly inflexed; second scale membranous, somewhat keeled, often adnate to the rachis; third scale hyaline, empty; fourth scale almost nerveless, enclosing a perfect flower and also usually a palet. Stamens 3. Stigmas twice as long as the styles, exserted above the base of the spikelet.

Type species, *Rottboellia compressa* L.

1. **Hemarthria fasciculata** (Lam.) Kunth, Rev. Gram. 453. 1831.

Rottboellia fasciculata Lam. Tab. Encyc. 1: 204. 1791.

Stems up to 8 dm. tall, compressed; leaf-sheaths compressed, keeled, glabrous, excepting on the ciliate margin; blades up to 2 dm. long and 6 mm. wide; spikes 3–8 cm. long, 3–4 mm. wide, compressed; sessile spikelets 5–7 mm. long, oblong, the first scale constricted below the obtuse apex; pedicellate spikelets 5–6 mm. long, acute.

TYPE LOCALITY: Barbary.
DISTRIBUTION: Southwestern Texas, Mexico, and in warm temperate and tropical regions.
ILLUSTRATIONS: Mart. Fl. Bras. 2^3: *pl. 72, f. 2;* Bull. U. S. Dep. Agr. Agrost. **7**: *f. 5;* Beal, Grasses N. Am. **2**: *f. 9.*

8. **HACKELOCHLOA** Kuntze, Rev. Gen. 776. 1891.

Manisuris Sw. Prodr. 25. 1788. Not *Manisuris* L. 1771.

Annual grasses with branching stems, flat leaf-blades and terminal and axillary short spikes which are sometimes partially included in the sheaths. Spikelets in pairs in excavations at the nodes of the rachis, one sessile, 1-flowered, the other pedicellate, but appearing as if sessile on account of the pedicel being adnate to the rachis, making its spikelet appear to form a pair with the sessile spikelet of the next higher internode. Scales of the sessile spikelet 4, awnless; first or outermost scale empty, firm, globose, pitted, covering the excavation in the rachis; second scale oval-oblong, concave, thin, 1-nerved; third scale shorter than the second, empty; fourth scale thin, hyaline, enclosing a perfect flower, and sometimes also a minute palet. Stamens 3. Styles distinct. Stigmas plumose. Pedicellate spikelet differing much in shape from the sessile and equaling or exceeding it in length, ovate; first scale 5–7-nerved, one margin narrowly infolded; second scale equaling the first, keeled, the keels ciliate, 5–7-nerved; third scale shorter than the first, 2-nerved, rarely with a staminate flower; fourth scale nerveless or 1-nerved, sometimes with a staminate flower.

Type species, *Cenchrus granularis* L.

1. **Hackelochloa granularis** (L.) Kuntze, Rev. Gen. 776. 1891.

Cenchrus granularis L. Mant. 575. 1771.
Manisuris granularis Sw. Prodr. 25. 1788.
Manisuris polystachya Beauv. Fl. Oware 1: 24. 1805.
Tripsacum granulare Rasp. Ann. Sci. Nat. 5: 306. 1825.

Stems 2–10 dm. tall, finally much-branched; leaf-sheaths papillose-hirsute; blades 1.5 dm. long or less, 3–15 mm. wide, papillose-hirsute on both surfaces, ciliate on the margins;

spikes 1–2 cm. long, the peduncles hirsute; sessile spikelet about 1 mm. in diameter; pedicellate spikelet about 2 mm. long, sterile, consisting of 2 scales.

TYPE LOCALITY: East Indies.
DISTRIBUTION: Georgia and Florida to Arizona and Lower California, and generally throughout tropical regions.
ILLUSTRATIONS: Beauv. Fl. Oware 1: *pl. 14;* Gaertn. Fruct. *pl. 175;* Lam. Tab. Encyc. *pl. 839;* Roxb. Pl. Corom. *pl. 118;* Bull. U. S. Dep. Agr. Agrost. 7: *f. 6;* 20: *f. 10;* Beal, Grasses N. Am. 2: *f. 10.*

9. **IMPERATA** Cirillo, Pl. Rar. Neap. 2: 26. 1792.

Perennial grasses with long leaf-blades and dense terminal spike-like panicles, which are often silvery from the long hairs surrounding the spikelets. Spikelets 1-flowered, rarely 2-flowered, in pairs, unequally pedicellate. Scales 4, thin, hyaline, awnless; outer 2 empty, pilose; third glabrous, empty, or rarely enclosing a palet and staminate flower; fourth scale glabrous, subtending a perfect flower and its 2-nerved palet which is truncate and toothed at the apex. Stamens 1 or 2. Styles distinct. Stigmas plumose.

Type species, *Lagurus cylindricus* L.

Stems solid; first scale of the spikelet more than 3-nerved.
  Hairs at the base of the spikelet about twice its length; first scale of the spikelet 4-nerved, the fourth scale wanting; panicle linear-oblong, rather lax. 1. *I. brasiliensis.*
  Hairs at the base of the spikelet about three times its length; first scale of the spikelet 4–6-nerved, the fourth scale present; panicle elongate, linear, very dense. 2. *I. Hookeri.*
Stems hollow; first scale of the spikelet 3-nerved. 3. *I. contracta.*

1. **Imperata brasiliensis** Trin. Mém. Acad. St. Petersb. VI. 2: 331. 1832.

Saccharum Sapé St. Hil. Voy. Distr. Diam. 1: 368. 1833.
Imperata Sapé Anderss. Oefv. Sv. Vet.-Akad. Förh. 1855: 159. 1855.
Syllepis Ruprechtii Fourn. Mex. Pl. Gram. 52. 1881.
Imperata caudata Chapm. Fl. S. U. S. ed. 2. 668. 1884. Not *I. caudata* Trin. 1833.

Stems up to 8 dm. tall, usually 3–6 dm.; leaf-sheaths smooth and glabrous, the basal ones at length becoming fibrous; blades erect, up to 4 dm. long, commonly less than 2 dm., densely hirsute on the upper surface near the base, long-acuminate, narrowed toward the base, less than 1 cm. wide; panicle up to 2 dm. long, dense, 2–3 cm. in diameter, obtuse, not attenuate at the apex, its branches erect or nearly so; spikelets 3–4.5 mm. long, the involucral hairs about twice as long.

TYPE LOCALITY: Brazil.
DISTRIBUTION: Florida, Bahamas, Cuba, Isle of Pines, and continental tropical America.
ILLUSTRATIONS: Mart. Fl. Bras. 2^3: *pl. 59, f. 1;* Bull. U. S. Dep. Agr. Agrost. 17: *f. 303.*

2. **Imperata Hookeri** Rupr.; Anderss. Oefv. Sv. Vet.-Akad. Förh. 1855: 160. 1855.

Imperata caudata Scribn. Bull. Torrey Club 9: 86. 1882. Not *I. caudata* Trin. 1833.
Imperata brevifolia Vasey, Bull. Torrey Club 13: 26. 1886.

Stems 5–12 dm. tall; leaf-sheaths smooth and glabrous; blades up to 5 dm. long and 1 cm. wide, long-acuminate, narrowed toward the base, hirsute on the upper surface near the base; panicle narrow, dense, 1.5–3 dm. long and 2.5 cm. wide, its branches erect, crowded; spikelets 3–4 mm. long, about one third as long as the involucral hairs.

TYPE LOCALITY: Texas.
DISTRIBUTION: Western Texas to California and Mexico.
ILLUSTRATIONS: Bull. U. S. Dep. Agr. Agrost. 7: *f. 2;* 20: *f. 5;* Bull. U. S. Dep. Agr. Bot. 13: *pl. 1;* Beal, Grasses N. Am. 2: *f. 5.*

3. **Imperata contracta** (H.B.K.) Hitchc. Rep. Mo. Bot. Gard. 4: 146. 1893.

Saccharum contractum H.B.K. Nov. Gen. & Sp. 1: 182. 1816.
Saccharum dubium H.B.K. Nov. Gen. & Sp. 1: 183. 1816.
Saccharum caudatum G. Meyer, Fl. Esseq. 68. 1818.
Anatherum portoricense Spreng. Syst. 1: 290. 1825.

Anatherum caudatum Sieber; R. & S. Syst. Veg. Mant. 2: 445. 1824.
Imperata caudata Trin. Mém. Acad. St. Petersb. VI. 2: 331. 1832.
Imperata exaltata caudata Hack. in DC. Monog. Phan. 6: 99. 1889.

Stems usually 1 m. tall or more; leaf-sheaths smooth and glabrous, or the basal ones sometimes pubescent; blades up to 6 dm. long, 1 cm. wide or less, long-acuminate, much narrowed toward the base, hirsute on the upper surface toward the base; panicle up to 4 dm. long, narrowed toward the apex, its lower branches elongated, lax and ascending; spikelets 3–4.5 mm. long, the involucral hairs 2–3 times as long.

TYPE LOCALITY: On banks of the Magdalena River, Colombia.
DISTRIBUTION: Mexico and Central America; Porto Rico; Guadeloupe; Dominica; Martinique; also in South America.

10. **MISCANTHUS** Anderss. Oefv. Sv. Vet.-Akad. Förh. **1855**: 165. 1855.

Tall erect perennial grasses, with usually flat leaf-blades, and terminal ample commonly hairy panicles. Spikelets 1-flowered, unequally pedicellate, arranged in pairs along the continuous branches of the panicle, articulated with the pedicel. Scales 4; outer 2 larger, empty, membranous, muticous; third scale also empty but thinner; fourth scale thinly hyaline, subtending a perfect flower, 2-toothed at the apex, the awn arising from between the teeth, usually slender, often with a twisted column at the base and geniculate, sometimes straight, rarely very short or wanting; palet thin, hyaline. Stamens 3. Styles distinct. Stigmas plumose.

Type species, *Eulalia japonica* Trin.

1. **Miscanthus sinensis** Anderss. Oefv. Sv. Vet.-Akad. Förh. **1855**: 166. 1855.

Saccharum polydactylon β Thunb. Fl. Jap. 43. 1784.
Saccharum japonicum Thunb. Trans. Linn. Soc. **2**: 328, in part. 1794.
Erianthus japonicus Beauv.; R. & S. Syst. Veg. **2**: 324, in part. 1817.
Ripidium japonicum Trin. Fund. Agrost. 169. in part. 1820.
Eulalia japonica Trin. Mém. Acad. St. Petersb. VI. **2**: 333, in part. 1832.

Stems 1–2 m. tall; leaf-blades up to 8 dm. long and 1.5 cm. wide; panicle 2–4 dm. long, its branches erect or ascending; spikelets 4.5–5 mm. long, yellowish-brown, shining, glabrous, encircled at the base with white or purplish hairs equaling or exceeding them, the awn 8–10 mm. long, spirally twisted at the base.

TYPE LOCALITY: China.
DISTRIBUTION: Escaped from cultivation in Florida, and at Washington, D. C.; a native of China, Japan, and the Celebes.
ILLUSTRATIONS: Bot. Mag. *pl. 7304*; Bull. U. S. Dep. Agr. Agrost. **20**: *f. 6*; Nicholson, Dict. Gard. 1: *f. 740*; Cycl. Am. Hort. *f. 1407*; Beal, Grasses N. Am. **2**: *f. 6*.

11. **SACCHARUM** L. Sp. Pl. 54. 1753.

Tall grasses with flat leaf-blades and usually large diffuse terminal panicles. Spikelets 1-flowered, the flower perfect, in pairs along the articulate branches of the panicle, one sessile, the other pedicellate. Scales 4; outer 3 empty, acute, hyaline or somewhat membranous, or indurated at the base; fourth scale shorter, bearing the flower. Stamens 3. Styles distinct. Stigmas plumose.

Type species, *Saccharum officinarum* L.

1. **Saccharum officinarum** L. Sp. Pl. 54. 1753.

Stems tall and leafy, sometimes several meters high; leaf-blades often over 1 m. long, up to 6 cm. wide; panicle up to 6 dm. long or more, diffuse.

TYPE LOCALITY: Both Indies.
DISTRIBUTION: Sometimes escaping from cultivation in warm and tropical regions.
ILLUSTRATIONS: Rumph. Amb. **5**: *pl. 74, f. 1*; Lam. Tabl. Encyc. *pl. 40, f. 1*; Woodv. Med. Bot. *pl. 196*; Tratt. Ausg. Taf. Arch. Gewächsk. *pl. 307, 307a*; Kerner, Gen. Pl. *pl. 101–103*; Tussac, Fl. Ant. **1**: *pl. 23–25*; Descourt. Fl. Ant. *pl. 283*; Hayne, Arzn. Gew. **9**: *pl. 30, 31*; Guimp. & Schlecht. Abb. Pharm. Bor. *pl. 100*; T. Nees, Pl. Off. *pl. 33–35*; Wagner, Pharm.-med. Bot. *pl. 23, 24*; Bot. Misc. *pl. 26*; Spach, Hist. Veg. *pl. 103*; Mém. Inst. Paris **1850**: *pl. 1, 2*; Schacht, Mad. & Ten. *pl. 1*; Bull. U. S. Dep. Agr. Agrost. **20**: *f. 7*; Beal, Grasses N. Am. **2**: *f. 7*.

12. **ERIOCHRYSIS** Beauv. Agrost. 8. 1812.

Usually rather low grasses, with commonly flat leaf-blades and terminal dense contracted hairy panicles. Spikelets hairy, 1-flowered, in pairs along the articulate branches of the panicle, the sessile spikelet perfect, the pedicellate one pistillate. Scales 4; outer 3 empty; fourth scale hyaline. Stamens 3. Styles distinct. Stigmas plumose. Grain free, oblong, included in the scales.

Type species, *Eriochrysis cayanensis* Beauv.

1. **Eriochrysis cayanensis** Beauv. Agrost. 8. 1812.

Stems up to 1.5 m. tall; leaf-sheaths usually pubescent, at least toward the apex, rarely glabrous; blades up to 2 dm. long and 1.5 cm. wide, usually densely pubescent on both surfaces; inflorescence usually golden-brown, dense, linear-oblong, obtuse, 1–3 cm. in diameter, up to 2 dm. long or sometimes more, the internodes of the rachis and the pedicels clothed with long golden-brown hairs on the margins and sometimes more sparingly on the back; spikelets oblong-elliptic, the callus and the margins of the first scale clothed with long golden-brown hairs which envelope the spikelet, the sessile spikelet 2–2.5 mm. long, the pedicellate spikelet a little smaller.

TYPE LOCALITY: French Guiana.
DISTRIBUTION: Tropical America.
ILLUSTRATIONS: Beauv. Agrost. *pl. 4, f. 11;* Lam. Tabl. Encyc. *pl. 908;* Dict. Sci. Nat. Monocot. *pl. 20;* Kunth, Enum. 1: Suppl. *pl. 38, f. 7.*

13. **ERIANTHUS** Michx. Fl. Bor. Am. 1: 54. 1803.

Ripidium Trin. Fund. Agrost. 169. 1820.
Spodiopogon Fourn. Mex. Pl. Gram. 52. 1881. Not *Spodiopogon* Trin. 1820.

Tall perennial grasses, with usually robust stems, flat leaf-blades, and open or contracted, usually hairy, panicles. Spikelets dorsally compressed, 1-flowered, perfect, in pairs at each node of the articulate and usually hairy rachis, with a basal ring of long hairs, rarely naked, one sessile, the other pedicellate. Scales 4, the outer firm, often hairy, the remainder hyaline; first scale flat on the back, 2-keeled, the margins infolded; second scale keeled, 1–3-nerved; third scale empty, sometimes mucronate; fourth scale often 2-toothed or 2-cleft at the apex, bearing an imperfect or sometimes a perfect awn; palet small, hyaline. Stamens 2 or 3. Styles distinct, elongate. Stigmas plumose, usually exserted at the side of the spikelet.

Type species, *Anthoxanthum giganteum* Walt.

Flowers diandrous.
- Anthers 1.5–2.5 mm. long, exserted, together with the stigmas, at the time of flowering.
  - Spikelets with a basal ring of hairs at least one half their length, the outer 2 scales long-pilose or becoming glabrous.
    - Awn flat, closely spiral at the base, forming a pronounced column, at the apex of which it is usually bent, the terminal portion contorted or loosely spiral; apex of the fourth scale deeply 2-cleft and long-ciliate.
      - Basal hairs twice as long as the yellowish spikelets which are nearly concealed in the copious hairs of the cream-colored panicle. 1. *E. divaricatus.*
      - Basal hairs sometimes equaling but not exceeding the brown spikelets which are plainly visible in the brown panicle. 2. *E. contortus.*
    - Awn terete, or flat only at the very base, without a spiral basal column, sometimes loosely or slightly twisted, not bent; fourth scale usually entire, rarely shortly 2-toothed.
      - Spikelets 4–6 mm. long, exceeded by the basal hairs.
        - Panicle yellowish-white, the spikelets nearly concealed by the copious hairs; basal hairs usually over twice as long as the spikelet. 3. *E. Tracyi.*
        - Panicle grayish-brown, the spikelets evident through the sparser hairs; basal hairs usually less than twice as long as the spikelet.
          - Internodes about as long as the spikelet, or shorter. 4. *E. saccharoides.*
          - Lower internodes much exceeding the spikelets. 5. *E. laxus.*
      - Spikelets 8–9 mm. long, much exceeding the basal hairs. 6. *E. brevibarbis.*
  - Spikelets naked at the base or with a few hairs, the outer 2 scales densely appressed-hispid. 7. *E. strictus.*
- Anthers 1 mm. long or less, rarely larger, they and the stigmas never exserted from the spikelet. 8. *E. Trinii.*

Flowers triandrous. 9. *E. jamaicensis.*

1. **Erianthus divaricatus** (L.) Hitchc. Contr. U. S. Nat. Herb. **12**: 125. 1908.

Andropogon divaricatum L. Sp. Pl. 1045. 1753.
Andropogon alopecuroides L. Sp. Pl. 1045. 1753.
Erianthus alopecuroides Ell. Bot. S. C. & Ga. **1**: 38. 1816.
Erianthus giganteus Muhl. Descr. Gram. 192. 1817.
Erianthus saccharoides Michauxii Hack. in Mart. Fl. Bras. **2**^{3}: 257, in part. 1883.
Erianthus alopecuroides hirsutus Nash, in Small, Fl. SE. U. S. 55. 1903.

Stems 1.5–3 m. tall, the apex, panicle-axis, and often also the nodes, clothed with long silky appressed hairs; leaf-sheaths glabrous or hirsute; blades 1.5–7 dm. long, 5–25 mm. broad, hirsute above near the base; panicle 2–3 dm. long, 5–10 cm. broad, oblong, its branches erect-ascending, the larger 4–11 cm. long; spikelets rather crowded, about one half as long as the basal hairs and one half again as long as the internodes; outer 2 scales about 6 mm. long, pilose with hairs less than one and a half times as long as the scales; fourth scale 2-cleft at the apex, the teeth acuminate, the awn 12–16 mm. long, the included portion a tightly spiral column, the remainder loosely coiled.

TYPE LOCALITY: North America.
DISTRIBUTION: Southern New Jersey to Florida and Texas.
ILLUSTRATIONS: Bull. U. S. Dep. Agr. Agrost. 17: *f. 304*; Britt. & Brown, Ill. Fl. *f. 211.*

2. **Erianthus contortus** Ell. Bot. S. C. & Ga. **1**: 40. 1816.

Erianthus alopecuroides contortus Vasey, Grasses U. S. 17. 1883.
Erianthus saccharoides contortus Hack. in DC. Monog. Phan. **6**: 132. 1889.
Erianthus Smallii Nash, Bull. N. Y. Bot. Gard. **1**: 429. 1900.

Stems 1–2.5 m. tall, the nodes often pubescent with readily deciduous hairs, the summit and panicle-axis glabrous or appressed-pubescent; leaf-sheaths smooth or rough, sometimes hirsute at the apex; blades 1.5–8 dm. long, 5–20 mm. wide, smooth or rough; panicle 1.5–4 dm. long, 3–6 cm. wide, its branches erect, the larger 4–10 cm. long; spikelets crowded, equaling but not exceeding the basal hairs and about one half as long again as the internodes; outer 2 scales 7–9 mm. long, pilose with long hairs, the fourth scale 2-cleft at the apex, the teeth long and subulate, the awn 1.5–2.5 cm. long, the included portion spiral at the base, the remainder loosely spiral.

TYPE LOCALITY: Savannah, Georgia.
DISTRIBUTION: Delaware (?) and Maryland to Florida and Texas.
ILLUSTRATION: Bull. Tenn. Exp. Sta. 7: *pl. 1, f. 4.*

3. **Erianthus Tracyi** Nash, Bull. Torrey Club **24**: 37. 1897.

Stems 2–4 m. tall, the summit and nodes, together with the panicle-axis and top of the otherwise glabrous sheaths, appressed-pubescent with long silky hairs; leaf-sheaths shorter than the internodes; blades 5 dm. long or more, 1.5–3 cm. broad, very rough, pilose above at the base; panicle 3–5 dm. long, 8–12 cm. wide, oblong, its pubescent branches erect-ascending, the larger 1–1.5 dm. long; spikelets crowded, less than one half as long as the basal hairs and one half again as long as the internodes; outer 2 scales 5–6 mm. long, pilose with hairs twice as long as the scale; fourth scale entire or somewhat 2-toothed at the apex, the awn 1.5–2 cm. long, straight or slightly flexuous.

TYPE LOCALITY: Starkville, Mississippi.
DISTRIBUTION: Mississippi and Louisiana.

4. **Erianthus saccharoides** Michx. Fl. Bor. Am. **1**: 55. 1803.

Anthoxanthum giganteum Walt. Fl. Car. 65. 1788. Not *Erianthus giganteus* Muhl. 1817.
Saccharum giganteum Pers. Syn. Pl. **1**: 103. 1805.
Saccharum alopecuroideum Nutt. Gen. **1**: 60. 1818.
Andropogon Erianthus Link, Hort. Berol. **1**: 243. 1827.
Erianthus saccharoides Michauxii Hack. in Mart. Fl. Bras. **2**^{3}: 257. 1883.
Erianthus saccharoides genuinus Hack. in DC. Monog. Phan. **6**: 130. 1889.
Erianthus compactus Nash, Bull. Torrey Club **22**: 419. 1895.

Stems 1–3 m. tall, the summit and nodes appressed-pubescent with long silky hairs; leaf-sheaths glabrous or hirsute; blades 1.5–7 dm. long, 6–25 mm. wide, usually hirsute; panicle 1–4 dm. long, oblong to oblong-elliptic; spikelets 4–6 mm. long, the outer 2 scales

long-hairy, the fourth scale slightly if at all 2-toothed at the apex, the awn straight or nearly so, 1.5–2.5 cm. long, usually about 2 cm.

TYPE LOCALITY: Carolina.
DISTRIBUTION: New Jersey to Florida and Texas; Cuba.
ILLUSTRATIONS: Bull. U. S. Dep. Agr. Agrost. 7: *f. 3;* 20: *f. 8;* Mart. Fl. Bras. 2^3: *pl. 61, f. 2;* Beal, Grasses N. Am. 2: *f. 8;* Bull. Tenn. Exp. Sta. 7: *pl. 2, f. 5;* Britt. & Brown, Ill. Fl. *f. 212, 213.*

5. **Erianthus laxus** Nash, Bull. Torrey Club **24**: 344. 1897.

Stems 2–3 m. tall, pubescent, especially at the nodes, with appressed hairs, those at the apex and on the panicle-axis long and copious; leaf-sheaths, particularly the lower ones, densely hirsute, especially at the ends; blades 2–5 dm. long, 6–12 mm. wide, hirsute on both surfaces, the upper surface becoming glabrous; panicle 4–5 dm. long, 1 dm. wide or less, its elongate and ascending branches lax and flexuous, the larger 2–2.5 dm. long; spikelets loosely disposed, about one half as long as the basal hairs and much exceeded by the internodes, especially by the lower ones; outer 2 scales 4–5 mm. long, pilose with long hairs; fourth scale entire or shortly 2-toothed at the apex, the awn straight or slightly flexuous, about 2 cm. long.

TYPE LOCALITY: Between Paola and the Wekiva River, Florida.
DISTRIBUTION: Known only from the type locality.

6. **Erianthus brevibarbis** Michx. Fl. Bor. Am. **1**: 55. 1803.

Saccharum brevibarbe Pers. Syn. Pl. 1: 103. 1805.
Erianthus alopecuroides brevibarbis Vasey, Grasses U. S. 17. 1883.
Erianthus saccharoides brevibarbis Hack. in DC. Monog. Phan. 6: 131. 1889.

Stems 1–1.5 m. tall, the nodes pubescent with readily deciduous hairs, the summit and panicle-axis glabrous; leaf-sheaths rough, the summit appressed-hirsute; blades 1.5–4 dm. long, 6–10 mm. wide, rough; panicle 2–3 dm. long, about 3 cm. wide, its branches erect, the larger 2–7 cm. long; spikelets crowded, exceeding the basal hairs and a little less than twice as long as the internodes; outer 2 scales 8–9 mm. long, sparingly pilose; fourth scale usually entire at the apex, the awn straight, 1.5–2.5 cm. long.

TYPE LOCALITY: Tennessee.
DISTRIBUTION: Delaware to Florida, west to Louisiana.
ILLUSTRATIONS: Ell. Bot. S. C. & Ga. 1: *pl. 1, f. 2;* Bull. Tenn. Exp. Sta. 7: *pl. 1, f. 3;* Britt. & Brown, Ill. Fl. *f. 214.*

7. **Erianthus strictus** Baldw.; Ell. Bot. S. C. & Ga. **1**: 39. 1816.

Saccharum Baldwini Spreng. Syst. 1: 282. 1825.
Pollinia dura Trin. Mém. Acad. St. Petersb. VI. 4^2: 91. 1838.

Stems 1–2 m. tall, the nodes usually pubescent with readily deciduous hairs, the summit and the panicle-axis glabrous; leaf-sheaths glabrous; blades 2–7 dm. long, 5–10 mm. wide, rough on the margins but otherwise smooth; panicle 2–4 dm. long, 1–2 cm. wide, its branches appressed, the larger 5–8 cm. long; spikelets crowded, about one half again as long as the internodes, the basal hairs wanting or sparse and less than one quarter as long as the spikelet; outer 2 scales 8–10 mm. long, strongly appressed-hispid; fourth scale entire, the awn 1.5–2 cm. long, straight.

TYPE LOCALITY: Savannah, Georgia.
DISTRIBUTION: Tennessee to Florida, west to Texas.
ILLUSTRATIONS: Bull. U. S. Dep. Agr. Agrost. 7: *f. 4;* Bull. Tenn. Exp. Sta. 7: *pl. 1, f. 2.*

8. **Erianthus Trinii** Hack. in DC. Monog. Phan. **6**: 135. 1889.

Saccharum giganteum Trin. Mém. Acad. St. Petersb. VI. **2**: 311. 1832. Not *S. giganteum* Pers. 1805.
Spodiopogon foliatus Fourn. Mex. Pl. Gram. 52. 1881.
Spodiopogon foliatus erubescens Fourn. Mex. Pl. Gram. 53. 1881.
Spodiopogon vaginatus Fourn. Mex. Pl. Gram. 53. 1881.
Erianthus saccharoides Trinii Hack. in Mart. Fl. Bras. 2^3: 258. 1883.

Stems up to 5 m. tall; leaf-sheaths glabrous or pubescent; blades glabrous or pubescent, 1 m. long or more, up to 2.5 cm. wide, long-acuminate; panicle up to 5 dm. long, oblong, the axis appressed-hirsute, the branches erect or nearly so; spikelets 5–6 mm. long,

lanceolate, attenuate, the outer 2 scales long-hairy, more than one half the length of the basal hairs, the inner scales colored or uncolored, the fourth scale entire, or sometimes minutely 2-toothed, bearing a straight or somewhat flexuous awn 10–12 mm. long, the base not spiral, the enclosed flower cleistogamous.

TYPE LOCALITY: Brazil.
DISTRIBUTION: Mexico; also in South America.

9. **Erianthus jamaicensis** (Trin.) Anderss. Oefv. Sv. Vet.-Akad. Förh. **1855**: 163. 1855.

Saccharum jamaicense Trin. Mém. Acad. St. Petersb. VI. 2: 312. 1832.
Erianthus Ravennae jamaicensis Hack. in DC. Monog. Phan. 6: 141. 1889.

Stems 1–2 m. tall; leaf-sheaths silky-villous on the inside; blades up to 6 dm. long and 6 mm. broad, very acuminate, glaucous beneath, the upper surface and the margins rough; panicle 2 dm. long, linear-lanceolate, the axis somewhat flexuous and roughened, the internodes a little longer than the pedicels and shorter than the spikelets, slender, linear, furnished with hairs longer than themselves; spikelets 5.5–6 mm. long, lanceolate, pale, about equaling the involucral hairs at the base, the outer 2 scales chartaceous, 3-nerved, somewhat caudate-acuminate, the first one, especially near the margins, with scattered hairs almost as long as themselves, the second scale glabrous, the third scale empty, faintly 5-nerved, membranous, the fourth scale hyaline, enclosing a hermaphrodite flower, and bearing at the apex a bristle-like straight awn about as long as the scale.

TYPE LOCALITY: Jamaica.
DISTRIBUTION: Known only from the type locality. This may be only a form of the Old World *E. Ravennae* (L.) Beauv., perhaps introduced into Jamaica and escaped from cultivation. It has not been reported recently from there.

14. **POLYTRIAS** Hack. in E. & P. Nat. Pfl. 2^2: 24. 1887.

Perennial grasses with flat leaf-blades and the inflorescence consisting of a single spike-like raceme with an articulate rachis of many internodes. Spikelets awned, 1-flowered, the flower perfect, or that of the pedicellate spikelet imperfect, in 3's at each node of the rachis, the primary one on a pedicel and finally deciduous alone, with a sessile one on each side, both of which are deciduous with the rachis-internode. Outer 2 scales equal, membranous, muticous; third scale wanting; fourth scale hyaline, bearing at the apex a perfect awn. Stamens 3. Styles about equaling the stigmas which are exserted from the apex of the spikelet.

Type species, *Polytrias praemorsa* Hack.

1. **Polytrias amaura** (Büse) Kuntze, Rev. Gen. 788. 1891.

Andropogon amaurus Büse, in Jüngh. Pl. Jungh. 360. 1854.
Andropogon diversiflorus Steud. in Zollinger, Syst. Verz. 58. 1854.
Pollinia praemorsa Nees; Steud. Syn. Gram. 409. 1855.
Polytrias praemorsa Hack. in E. & P. Nat. Pfl. 2^2: 24. 1887.
Polytrias diversifolia Baill. Hist. Pl. 12: 319. 1894.

Stems creeping, sending up erect or ascending branches up to 3 dm. long; leaf-sheaths glabrous; blades flat, 2–5 cm. long, 2–4 mm. wide, long-hairy; spike-like racemes 2–4 cm. long, densely villous; spikelets oblong or linear-oblong, 4–5 mm. long, pubescent with long brown hairs below.

TYPE LOCALITY: Java.
DISTRIBUTION: Introduced into Grenada; native of Java.
ILLUSTRATION: DC. Monog. Phan. 6: *pl. 1, f. 13.*

15. **ISCHAEMUM** L. Sp. Pl. 1049. 1753.

Colladoa Cav. Ic. 5: 37. 1799.
Meoschium Beauv. Agrost. 111. 1812.
Ischaemopogon Griseb. Fl. Brit. W. Ind. 560. 1864.

Usually perennial grasses, often tall, with flat leaf-blades which are convolute in vernation, and compressed spike-like racemes which are borne singly or in pairs at the apex of the stem and its branches, corymbose-fasciculate, or subpaniculate. Spike-like racemes

many-jointed, the rachis fragile and readily disarticulating. Spikelets in pairs, one sessile, the other pedicellate. Sessile spikelet 2-flowered, the lower flower usually staminate, the upper perfect; first scale chartaceous or coriaceous, awnless, flat or somewhat depressed on the back; second scale sometimes awned; third awnless and enclosing a staminate or very rarely a perfect flower; fourth scale hyaline or membranous, usually bifid and bearing a perfect awn from the sinus, the awn rarely imperfect or wanting. Pedicellate spikelets varying in sex. Stamens 3. Stigmas oblong, usually equaling the styles, exserted above the middle of the spikelet.

Type species, *Ischaemum muticum* L.

Racemes numerous at the apex of the stem and its branches; first scale of the spikelet not rugose. 1. *I. latifolium.*
Racemes in pairs at the apex of the stem and its branches; first scale of the spikelet transversely rugose. 2. *I. rugosum.*

1. **Ischaemum latifolium** (Spreng.) Kunth, Rev. Gram. 371. 1830.

Andropogon latifolius Spreng. Syst. 1: 286. 1825.
Spodiopogon latifolius Nees, Agrost. Bras. 360. 1829.
Andropogon diatherus Steud. Syn. Gram. 378. 1855.
Ischaemopogon latifolius Griseb. Fl. Brit. W. Ind. 560. 1864.
Ischaemum latifolium minus Fourn. Mex. Pl. Gram. 55. 1881.

A tall grass with short extravaginal innovations. Stems decumbent at the base, ascending, up to 1 m. tall, glabrous, bearing leafy branches below, flower-bearing ones above; leaf-sheaths somewhat compressed, smooth or rough, villous at the apex on the outside; blades lanceolate or linear-lanceolate, acuminate, those on the innovations and at the lower part of the stem strongly narrowed at the base, and at length disarticulating, those on the upper part of the stem usually rounded at the base, up to 3 dm. long and 4.5 cm. wide, usually shorter and narrower, smooth excepting on the margins, usually glabrous; racemes commonly 6–20, rarely double that number, 5–12 cm. long, digitate, or sometimes corymbose-paniculate in 2–4 alternate fascicles, the rachis densely barbed at the nodes and at the apex of the pedicels with long hairs, the internodes long-hairy, the pedicel grown to the callus of the sessile spikelet, and both adnate to the rachis; sessile spikelet with a long-hairy callus 2–3 mm. long, the first scale glabrous, 4.5–5 mm. long, the second scale about as long, sparsely long-hairy toward the apex, the fourth scale bearing a usually imperfect awn 8–12 mm. long; pedicellate spikelet with a long-hairy callus about 1.5 mm. long, the first scale about 4.5 mm. long, and, like the nearly equal second, sparsely long-hairy, the fourth scale bearing an awn similar to that of the sessile spikelet.

TYPE LOCALITY: Guadeloupe.
DISTRIBUTION: Mexico to tropical South America, and north in the West Indies to Guadeloupe; Jamaica (according to Fawcett).
ILLUSTRATION: Kunth, Rev. Gram. *pl. 99.*

2. **Ischaemum rugosum** Salisb. Ic. Stirp. Rar. 1. 1791.

Ischaemum segetum Trin. Mém. Acad. St. Petersb. VI. 2: 294. 1832.

Stems erect or ascending, branched at the base, up to 1 m. tall, glabrous; leaf-sheaths compressed, keeled below, glabrous, or sometimes pubescent near the apex; blades up to 3 dm. long and 1.5 cm. wide, usually hirsute on both surfaces; racemes in pairs, 3–6 cm. long, the rachis internodes with the exterior angle ciliate with long hairs, the interior angles with very short hairs; sessile spikelet, including the callus, about 5 mm. long, the first scale cartilaginous below and marked with 5–6 transverse irregular elevations, the upper portion membranous and veined, the second scale usually a little exceeding the first, coriaceous on the back, keeled, the third scale hyaline, the fourth scale also hyaline and bearing a perfect awn 15–20 mm. long, the column brown and about equaling the subulate portion; pedicellate spikelet shorter than the sessile one, the first scale with 2–4 usually less distinct transverse elevations, or these sometimes almost wanting, the fourth scale bearing an imperfect awn about 5 mm. long, the pedicel ciliate.

TYPE LOCALITY: Orissa, India.
DISTRIBUTION: Introduced at Madruga, Cuba. Widely distributed in tropical Asia and Malaysia.
ILLUSTRATION: Salisb. Ic. Stirp. Rar. *pl. 1.*

16. EREMOCHLOA Büse, in Jungh. Pl. Jungh. 1: 357. 1854.

Pectinaria Hack. in E. & P. Nat. Pfl. 2^2: 26. 1887.

Low perennial grasses, with flat leaf-blades, and solitary compressed 1-sided racemes, the rachis of many internodes and somewhat fragile. Spikelets single at the nodes of the rachis, the primary or pedicellate one reduced to a mere scale-like pedicel which rarely bears a bristle-like rudimentary scale, the secondary or sessile one developed, awnless, dorsally compressed, 2-flowered, the lower flower staminate, the upper one perfect, finally rather tardily deciduous with the attached rachis-internode; first scale chartaceous, broad, the margins narrowly infolded, 2-keeled, the keels pectinate with spines or rigid hairs; second scale 3-keeled; third scale hyaline, bearing a triandrous flower; fourth scale entire, muticous, enclosing a perfect flower. Stamens 3. Styles short. Stigmas linear, exserted below the middle of the spikelet.

Type species, *Eremochloa Horneri* Büse.

1. Eremochloa leersioides (Munro) Hack. in DC. Monog. Phan. 6: 264. 1889.

Ischaemum leersioides Munro, Proc. Am. Acad. 4: 363. 1860.

Stems 2–4 dm. tall, erect, slender, simple, hirsute, especially above; leaf-sheaths hirsute; blades 4–8 cm. long, 2–3 mm. wide, rigid, sometimes folded, hirsute; racemes 2–3 cm. long, somewhat curved, slender, the internodes about one half as long as the spikelets, barbed at the base, pubescent on the back; spikelets 3.5 mm. long, elliptic-oblong, spreading, the first scale flat or somewhat convolute, the keels pectinate with straight bristles, the longer ones about equaling the length of the scale, pilose on the back, the second scale pubescent below, the third scale ciliolate at the apex, the fourth scale oblong, glabrous, nerveless; primary spikelet wanting, its pedicel present, acuminate, barbed at the base, a little longer than the internode to which it is appressed.

TYPE LOCALITY: Whampoa, China.

DISTRIBUTION: Collected at San Francisco, California, by Bolander (according to Thurber); a native of southeastern China.

17. TRACHYPOGON Nees, Agrost. Bras. 341. 1829.

Tall, perennial, tufted grasses, with extravaginal innovations, long narrow leaf-blades, and terminal racemes, borne singly or digitately. Spikelets 1-flowered, in pairs at each node of the continuous rachis, one on a short pedicel, staminate, persistent, dorsally compressed, the other on a longer pedicel, enclosing a perfect flower, nearly cylindric, deciduous. Perfect spikelets with the first scale coriaceous, the margins involute and enclosing the outer scales; second scale also coriaceous, 3-nerved, furrowed on both sides of the thick keel; third scale hyaline; fourth scale hyaline at the base, gradually narrowed into a stout perfect awn; stamens 3; stigmas plumose, longer than the styles, exserted from the middle of the spikelet. Staminate spikelets with the first scale somewhat thinner, the margins narrowly infolded, 7–11-nerved; fourth scale mucronulate or shortly awned at the slightly 2-toothed apex; stamens 3; ovary and styles rudimentary.

Type species, *Andropogon Montufari* H.B.K.

Awns exceeding 3 cm. long, the hairs on the column equaling in length at least its diameter.
  Leaf-blades flat, or sometimes involute, never terete.
    Awns 3.5–7 cm. long, geniculate, the subula pilose only at the base with long ascending hairs, the upper portion hispid or scabrous; leaf-blades usually flat.
      Hairs on the column of the awn rarely exceeding in length its diameter, appressed.
        Leaf-blades short; ligule short, 5 mm. long or less. 1. *T. Montufari.*
        Leaf-blades long; ligule long, usually exceeding 1 cm. in length. 2. *T. Palmeri.*
      Hairs on the column of the awn exceeding in length several times its diameter, long and shaggy. 3. *T. plumosus.*
    Awns 10–12 cm. long, pilose their entire length with long spreading hairs. 4. *T. Gouini.*
  Leaf-blades terete.
    Leaves silky-villous; spikelets pubescent. 5. *T. canescens.*
    Leaves and spikelets glabrous. 6. *T. filifolius.*
Awns less than 3 cm. long, the column hirtulous with short appressed hairs, shorter in length than its diameter. 7. *T. Karwinskyi.*

1. **Trachypogon Montufari** (H.B.K.) Nees, Agrost. Bras. 342. 1829.

Andropogon angustifolius H.B.K. Nov. Gen. & Sp. **1**: 184. 1816. Not *A. angustifolius* Sibth. & Sm. 1806.
Andropogon Montufari H.B.K. Nov. Gen. & Sp. 1: 184. 1816.
Andropogon stenophyllus R. & S. Syst. Veg. **2**: 819. 1817.

Stems 6–8 dm. tall, rather slender, densely barbed at the nodes, otherwise smooth and glabrous; leaf-sheaths glabrous, or the basal ones sometimes pubescent; ligule 3–5 mm. long; blades erect, usually less than 1 dm. long, 2–3 mm. wide, rough, especially on the margins; racemes single, terminating the stem, the pubescent axis 4–5 cm. long; staminate spikelet about 6 mm. long, pubescent or nearly glabrous, oblong-linear, on a short pedicel; perfect spikelet with a long-hairy callus about 2 mm. long, the first scale about 6 mm. long, appressed-pubescent, oblong-linear, the awn of the fourth scale 4–5 cm. long, the spiral column appressed-pubescent, about as long as the subula which is hispidulous and somewhat contorted.

TYPE LOCALITY: Near Conocoto, Ecuador.
DISTRIBUTION: Chihuahua to Queretaro, Mexico; also in Ecuador.

2. **Trachypogon Palmeri** Nash, sp. nov.

Stems up to 13 dm. long, barbed at the nodes, otherwise smooth and glabrous; leaf-sheaths glabrous; ligule, that of the lower leaves, 1–2 cm. long; blades up to 3 dm. long, 1–2 mm. wide, rough, involute; raceme single, terminating the stem, the glabrous axis 6–10 cm. long; staminate spikelet on a short pedicel, 6–8 mm. long, oblong-linear, the first scale rather sparingly pubescent or glabrescent; perfect spikelet with a long-hairy callus about 2 mm. long, the first scale about 8 mm. long, hirsute with ascending hairs, the awn of the fourth scale 7–8 cm. long, the spiral column appressed-hirsute, a little longer than the subula, which is hispidulous and somewhat contorted.

Type collected at Guadalajara, state of Jalisco, Mexico, July–Oct., 1886, *Edward Palmer 467*.
DISTRIBUTION: Known only from the type locality.

3. **Trachypogon plumosus** (H. & B.) Nees, Agrost. Bras. 344. 1829.

Andropogon plumosus H. & B.; Willd. Sp. Pl. **4**: 918. 1806.
Trachypogon mollis Nees, Agrost. Bras. 343. 1829.
Heteropogon stipoides Presl, Reliq. Haenk. **1**: 335. 1830.
Heteropogon secundus Presl, Reliq. Haenk. **1**: 335. 1830.
Andropogon stipoides Kunth, Enum. 1: 487. 1833.
Trachypogon dissolutus Nees, Linnaea **19**: 695. 1847.
Andropogon dactyloides Steud. Syn. Gram. 381. 1855.
Trachypogon violaceus Anderss. Oefv. Sv. Vet.-Akad. Förh. **1857**: 49. 1857.
Trachypogon Preslii Anderss. Oefv. Sv. Vet.-Akad. Förh. **1857**: 50. 1857.
Trachypogon dactyloides Fourn. Mex. Pl. Gram. 66. 1881.
Trachypogon Mülleri Fourn. Mex. Pl. Gram. 66. 1881.
Trachypogon secundus Arechav. Anal. Mus. Nac. Montevideo **3**: 270. 1895.

Stems up to 1.5 m. tall, barbed at the nodes, otherwise glabrous; leaf-sheaths glabrous, or sometimes pubescent; ligule up to 3 cm. long; blades flat, or sometimes involute, up to 4.5 dm. long, 3–8 mm. wide, smooth or rough, glabrous or pubescent; racemes single, or in 2's or 3's, terminating the stem, the glabrous axis up to 2 dm. long; staminate spikelets 6–8 or rarely 10 mm. long, the first scale hirsute, oblong to linear or obovate-oblong; perfect spikelets with a long-hairy callus 1.5–2 mm. long, the first scale hirsute, 6–8 mm. long, the awn of the fourth scale 4.5–8 cm. long, the spiral column a little longer than the hispid or hispidulous subula, shaggy with long hairs.

TYPE LOCALITY: Cumana, Venezuela.
DISTRIBUTION: Texas to Arizona, and continental tropical America.
ILLUSTRATIONS: Bull. U. S. Dep. Agr. Agrost. **20**: *f. 11*; Bull. U. S. Dep. Agr. Bot. **12**[1]: *pl. 17*.

4. **Trachypogon Gouini** Fourn. Mex. Pl. Gram. 66. 1881.

Stems tall, the nodes barbed; leaf-sheaths glabrous; ligule short, truncate; blades glabrous, involute; raceme single, terminating the stem, the glabrous axis up to 3 dm. long; staminate spikelets with the first scale villous; perfect spikelets, including the long-

hairy callus, 9 mm. long, the first scale villous, the awn of the fourth scale 10–12 cm. long, long-hairy from base to apex, the column flexuous.

TYPE LOCALITY: Vera Cruz, Mexico.
DISTRIBUTION: Vera Cruz; Cuba.

5. **Trachypogon canescens** Nees, Agrost. Bras. 343. 1829.

Andropogon canescens Kunth, Enum. 1: 487. 1833.

Whole plant silky-villous. Stems up to 1 m. tall, sometimes glabrous; leaf-blades terete, channeled on the upper surface, up to 5 dm. long, about 1 mm. in diameter; ligule 2–4 mm. long; raceme single, terminating the stem, the pilose or glabrous axis 1–1.5 dm. long; staminate spikelet linear-oblong, about 7 mm. long, the first scale pilose with long hairs, the fourth scale sometimes bearing a short exserted straight awn; perfect spikelet with a barbed callus about 3 mm. long, the first scale silky-villous, about 8 mm. long, the awn of the fourth scale 3–5 cm. long, the column and sometimes the base of the subula hirsute with long ascending hairs, the remainder of the awn hispidulous.

TYPE LOCALITY: Southern Brazil.
DISTRIBUTION: Mexico and (according to Fournier) Nicaragua; also in Brazil.

6. **Trachypogon filifolius** (Hack.) Hitchc. Contr. U. S. Nat. Herb. **12**: 191. 1909.

Trachypogon polymorphus filifolius Hack. in Mart. Fl. Bras. 2^3: 264. 1883.

Stems up to 12 dm. tall, barbed at the nodes, otherwise glabrous; leaf-sheaths smooth and glabrous; ligule 2–5 mm. long; blades terete, smooth and glabrous, up to 3 dm. long, 1 mm. in diameter or less; raceme single, terminating the stem, the glabrous axis 1–2 dm. long; staminate spikelets about 6 mm. long, the first scale linear, glabrous, except at the ciliate apex; perfect spikelets with a long-hairy callus 2–3 mm. long, the first scale glabrous, except at the ciliate apex, linear, about 7 mm. long, the awn of the fourth scale 3–5 cm. long, the spiral column hirsute with long ascending hairs, about twice the length of the hispidulous subula.

TYPE LOCALITY: Caxoeira, Minas Garaes, Brazil.
DISTRIBUTION: Cuba; also in Brazil.
ILLUSTRATION: Mart. Fl. Bras. 2^3: *pl. 62, f. 1.*

7. **Trachypogon Karwinskyi** (Hack.) Nash, sp. nov.

Trachypogon polymorphus Karwinskyi Hack. in DC. Monog. Phan. 6: 329. 1889.

Leaves unknown; racemes in 3's, terminating the stem, the puberulent axis 10–12 cm. long; staminate spikelets 6 mm. long, linear-oblong, very densely appressed-pilose; perfect spikelets 9 mm. long, linear-oblong, densely appressed-pilose, the awn of the fourth scale 2–2.5 cm. long, the column shortly appressed-hirtulous, the hairs shorter than the diameter of the column, the subula about equaling the column in length.

TYPE LOCALITY: Mexico.
DISTRIBUTION: Known only from the type locality.

18. **ELYONURUS** H. & B.; Willd. Sp. Pl. **4**: 941. 1806.

Elionurus Kunth, Mém. Mus. Paris **2**: 69. 1815.

Tall and branched, or low and tufted, grasses, with often elongate leaf-blades, and terminal racemes. Spikelets in pairs in excavations at the rachis-nodes, one sessile, 1-flowered, or rarely 2-flowered, the other pedicellate and sometimes enclosing a flower. Scales 4, awnless; outermost scale larger than the rest, membranous, exhaling a balsamic odor when fresh or when soaked in water; second scale shorter, thinner, somewhat rigid, acute; third scale empty, or rarely in the sessile spikelet enfolding a staminate flower; fourth scale very thinly hyaline, in the sessile spikelet enclosing a perfect flower, in the pedicellate spikelet either empty or enclosing a staminate flower; palet minute or wanting. Stamens 3. Styles distinct. Stigmas plumose.

Type species, *Elyonurus tripsacoides* H. & B.

Extravaginal stolons present in addition to the intravaginal; stems usually much-branched.
  Spikelets with the back of the first scale glabrous, or with a few short hairs at the base. 1. *E. tripsacoides.*
  Spikelets with the first scale densely hairy on the back. 2. *E. ciliaris.*
Extravaginal stolons wanting, only intravaginal ones present; spikelets densely hirsute. 3. *E. barbiculmis.*

1. **Elyonurus tripsacoides** H. & B.; Willd. Sp. Pl. **4**: 941. 1806.

Rottboellia ciliata Nutt. Gen. 1: 83. 1818.
Andropogon tripsacoides H. & B.; Steud. Syn. Gram. 364. 1855.
Andropogon Nuttallii Chapm. Fl. S. U. S. 580. 1860.
Elionurus Nuttallianus Benth.; Vasey, Grasses U. S. 171. 1883.
Elionurus Nuttallii Vasey, Cat. Grasses U. S. 25. 1885.

A tall perennial with both intravaginal and extravaginal innovations. Stems up to 1.5 m. tall, glabrous, branching, the branches long and solitary; leaf-sheaths glabrous; blades up to 5 dm. long, prominently nerved, glabrous on the lower surface, the inner surface glabrous excepting at the hirsute base; racemes up to 1.5 dm. long, the internodes and pedicels ciliate on the margins with long hairs and hirsute on the back, the inner surface glabrous; sessile spikelets 7–9 mm. long, lanceolate, acuminate, the first scale glabrous on the back or with a few hairs at the base, the margins wing-keeled and hispidulous above the middle with short hairs, the apex deeply 2-toothed, the teeth subulate; pedicellate spikelets 5–6 mm. long, glabrous or puberulent.

TYPE LOCALITY: Caracas, Venezuela.
DISTRIBUTION: Georgia and Florida to Texas, and south to northern South America.
ILLUSTRATIONS: H.B.K. Nov. Gen. & Sp. 1: *pl. 62;* Bull. U. S. Dep. Agr. Agrost. 17: *f. 308;* Beal, Grasses N. Am. 2: *f. 13.*

2. **Elyonurus ciliaris** H.B.K. Nov. Gen. & Sp. 1: 193. 1816.

Tripsacum ciliare Rasp. Ann. Sci. Nat. 5: 306. 1825.
Elionurus tripsacoides ciliaris Hack. in DC. Monog. Phan. 6: 333. 1889.
Elionurus tripsacoides sericeus Hack. in DC. Monog. Phan. 6: 334. 1889.

A tall perennial with both intravaginal and extravaginal innovations. Stems up to 1 m. tall, glabrous, branched, the branches long and solitary; leaf-sheaths, at least the lower ones, ciliate on the margins and usually papillose-hirsute; blades up to 2 dm. long, involute, less than 1 mm. in diameter, prominently nerved, glabrous on the lower surface, or with a few long hairs at the base, densely hirsute on the upper surface; racemes 1 dm. long or less, the internodes and pedicels long-hairy on the margins and hirsute on the back, the inner face glabrous; sessile spikelets 7–9 mm. long, lanceolate, acuminate, the first scale hirsute on the back, the margins wing-keeled and hispidulous with short hairs, the apex deeply 2-toothed, the teeth subulate, the second scale shorter and thinner, pubescent; pedicellate spikelets about 5 mm. long, pubescent.

TYPE LOCALITY: In woods along the Orinoco, near Esmeralda, at the foot of Mt. Duida, southern Venezuela.
DISTRIBUTION: Mexico to Venezuela.
ILLUSTRATION: H.B.K. Nov. Gen. & Sp. 1: *pl. 63.*

3. **Elyonurus barbiculmis** Hack. in DC. Monog. Phan. **6**: 339. 1889.

A tufted perennial with intravaginal innovations, and simple or sparingly branched stems. Stems 4–6 dm. tall, pilose below the nodes with ascending hairs, otherwise glabrous; leaf-sheaths usually long-ciliate on the margins, otherwise glabrous; blades complanate, erect, prominently 5–7-nerved, up to 2 dm. long, 1 mm. wide or less, ciliate on the margins with very long hairs, the upper surface densely hirsute; racemes 1 dm. long or less, the internodes and the pedicels ciliate on the margins with very long hairs, hirsute on the back, the inner face glabrous; sessile spikelets 6–9 mm. long, the first scale densely hirsute with erect hairs, ovate to ovate-lanceolate when spread out, at the apex very acute and slightly 2-toothed to long-acuminate, with 2 long subulate teeth, the second scale thinner and shorter, hirsute; pedicellate spikelets 4–6 mm. long, hirsute.

TYPE LOCALITY: Western Texas.
DISTRIBUTION: Western Texas to Arizona, south to Durango.
ILLUSTRATIONS: Bull. U. S. Dep. Agr. Agrost. 7: *f. 7;* 20: *f. 12;* Bull. U. S. Dep. Agr. Bot. 12[1]: *pl. 15.*

PARTS OF VOLUMES PREVIOUSLY PUBLISHED

7[1]: 1–82. Ustilaginales: Ustilaginaceae, Tilletiaceae.

7[2]: 83–160. Uredinales: Coleosporiaceae, Uredinaceae, Aecidiaceae (pars).

9[1]: 1–72. (Agaricales:) Polyporaceae (pars).

9[2]: 73–132. (Agaricales:) Polyporaceae (conclusio).

22[1]: 1–80. Rosales: Podostemonaceae, Crassulaceae, Penthoraceae, Parnassiaceae.

22[2]: 81–192. (Rosales:) Saxifragaceae, Hydrangeaceae, Cunoniaceae, Iteaceae, Pterostemonaceae, Hamamelidaceae, Altingiaceae, Phyllonomaceae.

22[3]: 193–292. (Rosales:) Grossulariaceae, Platanaceae, Crossosomataceae, Connaraceae, Calycanthaceae, Rosaceae (pars).

22[4]: 293–388. (Rosales:) Rosaceae (pars).

25[1]: 1–88. Geraniales: Geraniaceae, Oxalidaceae, Erythroxylaceae, Linaceae.

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